IFIR WORKING PAPER SERIES

Public Finance in an Era of Global Demographic Change: Fertility Busts,
Migration Booms, and Public Policy

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IFIR Working Paper No. 2008-02

January, 2008

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Abstract

The rich countries of the world, especially those of Western Europe, are aging rapidly due to fertility rates far below the replacement rate, while experiencing substantial immigration from elsewhere in Europe, North Africa, and the third world generally. For the foreseeable future, West European countries will confront a policy tradeoff between population aging and (im)migration. The literature shows that both skilled and unskilled workers affect the highly redistributive fiscal systems of the advanced economies, the first as net contributors, the second as net beneficiaries. Age-imbalanced population structures in rich countries and global competition for labor create incentives to limit the extent of redistribution in rich countries.

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1   Introduction

The rich countries of the world, especially those of Western Europe, are in the midst of a truly remarkable demographic experience. Fertility rates are now far below the replacement rate and the populations of these countries are therefore aging rapidly. At the same time, the rich countries have been receiving substantial flows of migrants from elsewhere in Europe, North Africa, and the third world generally, partially offsetting low native fertility rates. For the foreseeable future, West European countries will confront a policy tradeoff between population aging and migration. This tradeoff – which involves not only "migration policy" narrowly construed, but a whole range of other fiscal and structural policies such as EU enlargement – has many far-reaching consequences, since immigration affects all aspects of economic and social life.

The following discussion draws together empirical and theoretical findings from several branches of inquiry in order to identify some of the important interactions between fertility, migration, and fiscal policies. The basic theme of the paper is that demographic change, past and prospective, carries major implications for the fiscal systems of the advanced economies, especially those of Western Europe. Differences in levels of economic development means that the incentives for both skilled and unskilled workers to migrate from relatively young third-world countries to relatively old rich countries are strong and persistent. Both skilled and unskilled workers affect the highly redistributive fiscal systems of advanced economies, the first as net contributors, the second as net beneficiaries. Global competition for labor as well as demographic changes create incentives for the adjustment of fiscal policies, especially in advanced economies, where the public sector plays a major role in the redistribution of income. In particular, skilled workers generally offer a fiscal premium for the nations in which they reside. Competition for these workers affects the allocation of skilled labor throughout the world, with implications for earnings and income levels and distribution, output, and other important economic outcomes.

It is impossible to foresee with any precision how these powerful forces will interact: as the demographic developments of the past several decades show, our ability to predict fertility and migration behavior is quite limited, and of course economic forecasting is a notoriously inexact science. To these uncertainties, one must add the difficulties of predicting policy changes through political processes which are sometimes democratic, sometimes not so, sometimes peaceful, sometimes violent. With these qualifications in mind, there is still at least a basis for a presumption that competitive pressures will work to limit the extent of redistribution in rich countries, including not only intergenerational redistribution but also other forms of explicit and implicit redistribution. At the same time, global integration of factor markets should promote more productive utilization of the world's productive resources, including human capital. Factor market integration can also strengthen incentives for human capital investment, both in rich and poor countries.

To set the stage for this discussion, Section 2 reviews some of the basic facts about fertility and migration with particular reference to the countries of Western Europe. These facts are becoming increasingly familiar but it is helpful to review fertility and migration trends in relation to each other. Section 3 discusses the fiscal impacts of migration, emphasizing that migrants (like all households) affect both the revenue and the expenditure sides of the fiscal accounts. They do so in ways that vary over the life cycle and that depend

importantly both on the characteristics of the migrants themselves and of the fiscal systems under which they live. Section 4 discusses why and how fiscal competition for migrants may evolve over time, that is, the nature of policy adjustments that may arise as fiscal systems adapt to internal (native age structures) and external (migration) demographic forces. Section 5 concludes.

2 The Demographic and Economic Setting

2.1 Fertility Rates and Age Structures

Some of the basic demographic facts facing the countries of Western Europe are by now relatively familiar. In particular, these countries are experiencing a true fertility bust. The total fertility rate – the number of children born by a woman in her lifetime – is a standard demographic measure for which data are available for many countries and many years. The benchmark fertility rate is 2 – the number of children which women must have, on average, if a population is to replenish itself over time.[1] As shown in Table 1, fertility rates in OECD countries are now at remarkably low levels. A simple unweighted average of the fertility rates for the OECD countries is 1.56, far below the replacement rate. Figure 1, which focuses on West European countries, show that today's low fertility rates are hardly a new phenomenon: whereas the simple unweighted average fertility rate was 2.7 in 1960 for the countries shown in Figure 1, this average had fallen below 2.0 by 1976 and below 1.7 by 1984. During the period 1994-2003, it fell below 1.6 before recovering slightly, to about 1.61, in the two most recent years for which data are available (data drawn from World Bank (2007)). The consequence of low and falling fertility rates (not to mention rising life expectancies, as well), of course, is an aging population. Figure 3 illustrates the basic trend. For West European countries, the old-age dependency ratio (population over 65 as a percentage of total population) has risen from 10 to more than 15 percent (a simple unweighted average) since 1960. This "graying" of the population has been gradual and well-documented.

Predicting the future is harder than documenting the past. In some respects, however, demographic extrapolations are easier than economic forecasting because of the inertia of demographic change. For example, all of those who will be 50 years old or older in 2050 are already born. Fertility rates in the future can certainly change, but a sudden increase in the fertility rates of native-born Western Europeans back to the levels of the 1970s or earlier would be surprising; more likely, such an increase would not occur in less than a decade or two, if at all. Barring major wars or epidemics, and abstracting from migration, which is discussed further below, the evolution of the old-age dependency ratio for the next several decades is largely already determined. Dang et al. (2001), for example, present estimates (see Table 1) showing that old-age dependency ratios for OECD countries will rise from the current level of about 25% to about 50% by the period 2035–2050. (Similar estimates appear in European Commission (2005).) It should be noted that

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[1] Since not all children survive to reproductive age and some are infertile, the benchmark rate is actually slightly higher than 2 in advanced economies. A society with high mortality for young people would require a significantly higher fertility rate. The total fertility rate is of course not the sole important determinant of population growth. In particular, the timing of births is important as well. In general, women in populations with low fertility rates also tend to have children at older ages, reinforcing the trends described below.

the low-fertility/rising old-age dependency pattern is far less pronounced in the US than for other OECD countries, a reflection, in significant part, of several decades of high rates of immigration. It should also be noted that this basic pattern is found throughout Europe, including in East European countries like the Czech Republic, Hungary, and Poland.

These demographic data carry obvious implications for the public pension and health systems of developed countries. As shown in Dang *et al.*, the aging of populations in OECD countries is expected to put fiscal systems in these countries under increasing stress. For instance, spending on old-age pensions presently amounts to about 7.4% of GDP for OECD countries[2], and this proportion is projected to rise to about 10.8% by 2050 under mid-range demographic and economic assumptions. For France and Germany, current spending is much higher, at about 12% of GDP, and is projected to rise to about 16% of GDP by 2050. For other countries, such as the UK and the US, this category of spending is much lower (about 4.3% of GDP) and is projected to rise relatively little (about one percentage point for the US) or even to fall (about 0.7 percentage points for the UK). As a whole, however, the low fertility rates of the West European countries mean that old-age-related spending (including not only old-age pensions but health-care and other spending) will rise substantially over time, in the absence of significant demographic or economic change.

2.2   International Migration

A full appreciation of the demographic situation facing Western Europe cannot omit migration, which in turn depends critically on demographic and economic conditions in this region relative to the rest of the world.

First, although fertility rates world-wide have been declining for some time, they remain quite high in regions such as the Middle East and North Africa, Southern Africa, and South Asia. As shown in Figure 3, fertility rates in these regions range from 2.8 (Sub-Saharan Africa) to 3.3 (Middle East/North Africa), well above the replacement-rate benchmark of 2.[3] Thanks to their high fertility rates (and shorter life expectancies), countries in these regions have much younger and more rapidly-growing populations than the nations of Europe, West or East.

Furthermore, the populations in these other regions are relatively poor: as illustrated in Figure 4, the countries of Western Europe (identified in World Bank data as the countries of the European Monetary Union) have real per-capita incomes far higher than the nearby regions of Eastern Europe, Central Asia, the Middle East, and North Africa, not to mention the somewhat more-distant regions of Sub-Saharan Africa and South Asia. In 2006, the EMU countries had a per-capita GDP of $21,704 (2000 dollars). Of the other regions shown in Figure 5, "Europe and Central Asia" (a classification that includes Eastern Europe and the countries of the former Soviet Union) has the highest current per capita GDP, at $2689 in 2006, while per-capita GDP in the Middle East and North Africa was $1839, in South Asia it was $605, and in Sub-Saharan Africa it was $583. As Figure 4 shows, the trends of the past half-century provide no basis for any expectation that the gap in per capita incomes will close to less than a factor of 5 in the next several decades. Income differentials

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[2]This is a simple unweighted average for these countries; see Dang et al., Table IV:4.

[3]Additional data on fertility, age structure, and life expectancies throughout the world can be found in UN (2004).

of this magnitude swamp measurement errors.

Strong current and future demographic potential and economic incentives for people to migrate to Western Europe from Eastern Europe and from many poor regions of the world are apparent from the data just described. The effect of these incentives, even in the face of somewhat restrictive migration policies, is easily seen.

To begin with, Table 2 displays inflows and outflows of population, expressed as a percentage of total population, as well as net and gross flows, for West European countries. These countries generally exhibit positive net migration since 1988, though of course with some variation.[4] (The implications of high *gross* migration rates are discussed later.) The cumulative effects of net immigration *flows* are shown in Tables 3 and 4, which present two measures of the *stock* of "immigrants," corresponding to two different measures that are typically used in population records. Table 3 shows that the stock of "foreign-born" individuals in several West European OECD countries (Austria, Ireland, the Netherlands, Sweden) amounts to more than 10% of the total population, close to (or exceeding) the US figure of 12.9%. Table 4 shows stocks of "foreign" population for a number of (mainly West European) countries. The key difference between "foreign" and "foreign-born" is that an immigrant who acquires citizenship, though still foreign-born, is no longer counted as foreign. Foreign populations are generally smaller than foreign-born populations, especially in countries with high rates of naturalization, as is apparent from a comparison of those countries for which both measures are available. For instance, there are more than twice as many foreign-born as foreign in both Sweden and the Netherlands.

Immigrants account for a significant share of the populations of West European countries today. A sense of what the future may hold can be obtained by comparing migration flows in recent years with the other sources of demographic change – fertility and mortality. As shown in Figure 5 (see OECD (2003, Chart I.10)), the combination of sustained positive net migration and low fertility means that for the EU as a whole, and for a number of individual countries, the rate of net migration has exceeded the rate of natural increase since the mid-1980s.[5] Immigrants are younger than native populations and their fertility rates reflect those of their native countries until they become assimilated into their new countries of residence.[6] For both of these reasons, the demographic, economic, and fiscal impacts of immigration are certain to become more prominent in the near future: the foreign-born population, and their immediate offspring, will constitute a growing fraction of the West European population for several decades. As a matter of demographic inertia, this would be true, even if immigration flows were assumed (say, as the result of unrealistically draconian policy restrictions) to drop instantly to zero. As we have seen, however, the fundamental incentives for immigrants to come to Western Europe from the younger and

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[4]The migration data in this and the following tables reflect *legal* migration. By its nature, illegal migration is difficult to document. The US Office of Immigration Statistics (2003) estimates that there were 3.5 million illegal immigrants in the US in 1990, a number that grew to 7 million by the year 2000, representing an average annual inflow of about 0.35 million. These figures may be compared to a flow of 4.5 million *legal* immigrants during the decade 1971–1980, 7.3 million during 1981–1990, and 9.1 million during 1991–2000, suggesting that illegal immigrants constitute about 20–30% of the total annual US immigrant flow in recent decades. More recently, the Department of Homeland Security has estimated that the population of "unauthorized" immigrants was approximately 8.5 million in 2000 and that this figure had risen to 11.6 million by 2006 (see Hoefer *et al.* 2007). Similar figures might be presumed for West Europe, in which case the figures shown in Tables 2–4 significantly underestimate the net immigration flows and stocks.

[5]Figure 5 illustrates clearly that while net migration rates fluctuate over time for individual countries, the overall net migration rate for the EU is relatively stable, showing the importance of local short-run variations in labor demand as well local migration and other policies.

[6]See, e.g., Bauer et al. (2000) for a review of the literature on the assimilation of immigrants.

poorer regions of the world are large and highly persistent. Variations in local economic conditions and policies may deflect future immigration flows from one country to another, but the share of immigrants and their immediate offspring will certainly rise for many decades to come.

2.3   Age-Related Spending: Migration to the Rescue?

If the populations of Western Europe are age-imbalanced due to sustained low fertility, and if the populations of poor countries are relatively young due to continued comparatively high fertility, and if large income differentials create powerful incentives for the latter to migrate toward the former, perhaps international migration will restore a more age-balanced demographic structure in Western Europe, providing the active labor force needed to finance social benefits for the elderly. In short, perhaps migration will "solve" the age-related issues facing the fiscal systems of Western Europe.[7]

It is impossible to forecast migration flows and their impacts without forecasting migration policies, and part of the task of the following discussion is precisely to assess the incentives for rich and aging countries to adjust their migration policies. Nevertheless, it is instructive to consider hypothetical extrapolations of migration trends to see how they could possibly affect the populations of destination countries. An analysis by the UN (2000) provides "best guess" projections for migration and demographic structure and examines what migration flows would permit the attainments of various demographic targets.

The mid-range projections of this study find that West European countries will experience continued net immigration for the next half century. Under these projections, immigration will mitigate but not fundamentally alter the basic demographic trends implied by low fertility. The European Union is projected to absorb approximately 16 million immigrants by 2050, but the "support ratio," that is, the number of people age 15–64 divided by the number of people over 65, would still fall from its 1995 value of 4.3 to 1.97 by 2050. Although this "medium variant" projection is higher than the projected 1.89 under the assumption of zero net migration, it also indicates that continued immigration, at rates similar to those experienced in recent decades, will not dramatically affect the age structure of the population (UN 2000, Tables IV.4 and IV.5).

Indeed, to maintain the 1995 support ratio of 4.3, the EU countries would need to absorb about 12 million immigrants *annually*, in contrast to annual flows throughout the 1990s of at most 1.3 million. Sustained over the next 50 years, this ten-fold higher immigration rate would result in about 700 million net immigrants; by 2050, about 75% of the total EU population would either be immigrants or the descendants of post-1995 immigrants, in contrast to the medium-variant projection of 6.2% (UN 2000, Tables IV.4, IV.7). One can use these two cases – a constant support ratio compared to one that falls by somewhat more than half in 2050 – to gauge the migration implications of various intermediate cases. In the absence of extremely high immigration rates, sustained over many decades, low fertility rates and long life expectancies imply that the countries of Western Europe will face age-imbalance demographic structures, and their fiscal consequences, for the foreseeable future.

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[7]Storesletten (2000) examines the impact of immigration on the US social security system.

3 Fiscal Impacts of Migration

Immigrants affect a country's fiscal system in many different ways, starting from the moment of arrival and continuing throughout the life cycle (or as long as the immigrant remains in the country).[8] The paragraphs to follow focus on the impact of immigration on public pension systems, an important issue for advanced economies in view of their current demographic, economic, and fiscal circumstances as described above. Before turning to a detailed discussion of public pensions, however, it is useful to consider the fiscal implications of migration in a somewhat broader context.

To begin with, note that immigrants, like all of a country's residents, contribute to public-sector revenues and impose public-service burdens in multitude of ways, direct and indirect. These effects depend on the immigrant's age, sex, health, consumption patterns, education level, earnings, savings behavior, legal status, and other socio-economic characteristics. Most of these characteristics change over time and vary from one person to another, and the fiscal impacts of immigration are as diverse and complex as immigrants and fiscal systems. Accurate and comprehensive assessments are difficult and generalizations, though possible, can easily be misleading or inappropriate for the analysis of important types of policy questions. This becomes increasingly apparent as one reviews systematically the revenue- and expenditure-side interactions of migrants with a country's fiscal system.

Consider the revenue side first. In West European countries, social insurance contributions, personal income and payroll taxes, and value-added taxes are major sources of tax revenues. Legal immigrants (or their employers) pay taxes on earnings, either through payroll taxes or personal income taxes, in amounts that depend positively on the immigrant's earnings. Both legal and illegal immigrants pay value-added taxes, in amounts that depend on consumption preferences as well as income. These sources of revenues will be relatively small for low-income immigrants but larger for those with higher incomes – which, in turn, means (on average) for those with better education, better health, in the peak earnings part of the life cycle, and with greater amounts of accumulated non-human wealth. Note that all or most of these attributes are potentially observable and can be (and in practice are) used as explicit or implicit screens for determining "desired" types of immigrants. Moreover, changes in tax policy – the mix of different taxes, their rates, and their administration and enforcement – change the tax treatment of immigrants relative to natives and of different types of immigrants, offering important opportunities for differential fiscal treatment of immigrants.

Immigrants also generate revenues through non-tax sources. Prices or fees are or could be used to defray the costs of public services such as health, education, transportation, and housing. As a matter of policy choice, these revenue instruments can be used more or less intensively, and, in some cases, they are or can be used differentially for immigrants. For instance, fares for public transportation are commonly collected from all users, independently of citizenship status and, for that matter, usually independently of legal status. As in the case of tax policy, however, there are many ways in which the structure of transportation pricing differentiates implicitly if not explicitly between native residents

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[8]Emigrants also affect fiscal systems. Many of the remarks that follow are equally applicable, in reverse, for emigrants, and both are important. Obviously, the fiscal effects of migration, in either direction, are especially critical in countries where fiscal systems are "large," i.e., in practice, in rich countries. By conventional measures, redistributive fiscal policies in poor countries are quite limited, and the fiscal impacts of migration are accordingly much smaller.

and different types of immigrants. As one illustration, special discounts or subscriptions are sometimes made available for the elderly, students, or other demographic or economic subgroups, a price structure that differentially affects immigrants. Similarly, access to hospitals and clinics may be differentially priced for those who participate in national health systems, effectively discriminating among users based on citizenship or legal status. In the US, at least, it is common for explicit tuition charges at public colleges and universities to distinguish between in-state and out-of-state students, with non-citizens included in the latter category, and financial aid programs, utilized by students attending both private and public institutions, can and do discriminate on the characteristics of students (and their families). Although prices for access to higher education in West Europe are normally much lower than in the US, this is a policy choice and the option exists to alter the policy, including in ways that would require foreign students to bear a larger share of the costs of education provided to them.

On the expenditure side, immigrants will, of necessity, benefit from non-exclusive public goods and services, even though these may be congestible, i.e., even if immigrants impose *added costs* of service provision and, in this way, affect the fiscal system. Examples of public services with limited excludability but significant congestibility include public safety (expenditures on police and fire protection depend on the size of the population being served), public health and sanitation (sewage, water treatment, refuse collection), parks and recreation, and (unpriced) roads. Nevertheless, as already suggested, access to public services may be in some cases be restricted to citizens or at least to legal immigrants, or, if desired, targeted at immigrants. Policy decisions about the location of public facilities such as health clinics or schools (e.g., whether to locate such facilities in immigrant enclaves) or about whether to provide multilingual services differentially affect immigrants and natives, implicitly or explicitly.

For some public-sector activities, the fiscal impact of immigrants may be somewhat indirect. Insofar as publicly-provided housing, rent subsidies, or tax preferences for the housing sector increase housing supply and lower the equilibrium price of housing, all housing consumers are made better off, regardless of immigrant or citizenship status. The same is true for subsidies that increase the supplies of medical personnel, pharmaceuticals, elder-care facilities, and the like: to the extent that these policies affect the equilibrium prices, all consumers share in the benefits and add to the fiscal burden.

The children of immigrants also affect a country's fiscal system, both on the revenue and expenditure sides, whether or not they are immigrants themselves. From an *ex ante* policy perspective, these effects are contingent upon the initial arrival of the immigrant parent(s), and thus, arguably, should be included in a comprehensive analysis of the impact of immigration. To do otherwise would, in effect, amount to the assumption that immigrants will be infertile, an assumption which is certainly extreme and, for "representative" recent immigrants in Western European countries, is empirically quite incorrect since, as noted earlier, these immigrants often tend to have higher fertility rates than native West Europeans.

As these general remarks indicate, immigrants interact with a jurisdictions fiscal system in many ways over time. A proper assessment of the fiscal impact of immigration would ideally take into account the totality of these interactions.

3.1 Immigration and Public Pension Systems

All aspects of the fiscal impact of immigration are worthy of careful analysis. The impacts of immigrants on public pension systems are of special interest, however, for several reasons. First, as noted earlier, public pensions are major elements of the fiscal systems of West European nations. Second, since participants in these systems pay taxes when young and receive benefits when old, public pension systems illustrate very well the importance of considering *both* the tax and the expenditure sides of government accounts simultaneously, and in an *intertemporal* context. Third, the benefits and costs of public pensions are comparatively easily measured, at least in principle.

At a basic theoretical level, the concept of "net public pension wealth" ($NPPW$) (Feldstein (1974)) provides a convenient summary of the impact of a public pension system on a household's lifetime wealth. $NPPW$ is the present value of future public pension benefits received by a household, net of taxes paid into the public pension system. If $NPPW > 0$ for an individual or household, participation in the system involves a net transfer to the household from the rest of society, whereas the opposite is the case if $NPPW < 0$. This variable, or its negative, also measures the present value of the impact of a household on the public pension system.

More formally, suppose that households are life-cycle utility-maximizers who supply labor inelastically and who have utility functions defined over lifetime consumption streams.[9] Retirement occurs with certainty at age R and death occurs with certainty at age D. Assume that every household supplies one unit of labor until retirement, earning w_i annually if it resides in country i. (The assumptions that labor supply and annual earnings are constant over time are made for notational simplicity.) Let c_t denote the value of consumption in period t of the life cycle, and r denote a fixed market interest rate. In the absence of any government fiscal policy, the household faces a lifetime budget constraint, starting at age 0, of

$$\sum_{t=0}^{D} \frac{c_t}{(1+r)^t} = \sum_{t=0}^{R} \frac{w_i}{(1+r)^t}. \tag{1}$$

The budget constraint for an older household is identical to (1) except that it covers a shorter horizon, beginning at some initial $t_0 > 0$.

To incorporate a public pension system into this framework, suppose that the benefit received by a worker in country i is a lump-sum annuity of b_i, financed by a proportional payroll tax at rate τ_i. (It is straightforward to use more a realistic specification at the cost of slightly more complex notation.) Then the budget constraint facing a worker residing in country i becomes

$$\sum_{t=0}^{D} \frac{c_t}{(1+r)^t} = \sum_{t=0}^{R} \frac{(1-\tau_i)w_i}{(1+r)^t} + \sum_{t=R}^{D} \frac{b_i}{(1+r)^t}. \tag{2}$$

Public pensions raise lifetime wealth by providing a flow of benefits during retirement, but reduce lifetime wealth by requiring a flow of contributions during the working years. The

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[9]This framework is presented and discussed in more detail in Wildasin (1999). See Uebelmesser (2004) for a recent discussion of public pension systems and many additional references to the literature.

net effect of the public pension program on lifetime wealth for workers in country i, is thus

$$NPPW_i = \sum_{t=R}^{D} \frac{b_i}{(1+r)^t} - \sum_{t=0}^{R} \frac{\tau_i w_i}{(1+r)^t}. \tag{3}$$

The sign and magnitude of this expression depends on market prices (wages and interest rates), individual household attributes (current age, labor market participation and earnings, ages of retirement and death), and of course on the policy parameters – the tax rate and benefit level.

In principle, the computation of $NPPW_i$ is not a complex undertaking, but in practice there is much room for variations in its estimation.[10] The impact of a country's public-pension system on a household net lifetime wealth depends on the household's earnings and the country's policies, as is also true when calculating the impact of migration on a country's public pension system: how much immigrants pay in taxes or receive in benefits depends on their employment and earnings paths over the life cycle as well as on tax and expenditure policies, which are only observable retrospectively. Analysis of the historical impact of immigrants on a public pension system, while interesting, does not provide direct information about the impact of prospective immigrants on the future of a public pension system. The evaluation of this effect requires information which cannot be known with certainty and can only be imperfectly foreseen.

Despite its inevitable limitations, net public pension wealth does provide a present-value measure of the fiscal interactions between a household (or individual) and a public-pension system. It takes into account both the tax contributions made by the household and the expenditures on benefits that it receives at different stages of the life cycle, discounted to the present. For West European countries, estimated net public pension wealth is typically negative, and substantially so, for representative young workers. One way to assess this particular fiscal burden is to compare $NPPW$ with lifetime wealth, that is, with the present value of lifetime earnings. This burden can easily exceed 10% of lifetime wealth (Wildasin (1999)). Expressed somewhat differently, participation in the public pension systems of some West European countries would, on balance, be equivalent to imposing a payroll tax at a rate of (say) 10% over a households entire lifetime.

More generally, looking beyond public pension systems and evaluating the total fiscal system more comprehensively, one can apply the methodology of "generational accounting," an exercise which requires projections of future policy, economic, and demographic variables (see especially Auerbach et al. 1999). The basic finding from research on generational accounting research is that current fiscal policies in advanced economies, within the context of standard demographic and economic projections, exhibit significant generational imbalances in the sense that fiscal policy, on balance, shifts resources toward those

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[10]As noted by Leimer and Lesnoy (1982), and as discussed much more fully in Leimer and Lesnoy (1980, 1981), the calculation of $NPPW_i$ is a forward-looking exercise. If a calculation of $NPPW_i$ is to be used as an explanatory variable for predicting household behavior, then what is needed is an estimate of *expected* $NPPW_i$. The savings or migration behavior of today's 20 or 30 year-olds may be affected by public pension systems in which they will participate for another half-century, and although it is reasonable to imagine that households do make forward-looking decisions, it is not at all obvious how they gauge their own life prospects (future employment and earnings, health, and mortality) or future public-sector fiscal policies over such long periods of time. The same basic issues arise in a different but related area of analysis: the effect of public pension systems on fertility. As discussed in Barro and Becker (1988), Becker and Barro (1989), and Wildasin (1990,a), future public-sector debt obligations reduce the return to child-bearing for altruistically-disposed parents. Whether future public-pension obligations in EU countries help to explain lower current fertility rates in this region is an intriguing hypothesis, but one that presents formidable challenges for empirical research.

presently alive, at the expense of future generations. Existing public sector debt obligations constitute one important component of the fiscal burden that future generations face, but the generational accounting approach makes clear that the implicit liabilities of the public sector are also quite large. Underfunded public pension obligations – that is, the fact that net public pension wealth is negative for current and future generations – are the outstanding example of such implicit liabilities.

Because of anticipated demographic changes, young immigrants to EU countries with attributes similar to those of existing residents are generally expected to be "net fiscal contributors." That is, the fiscal system is positively affected by the arrival of such immigrants, taking into account the entire lifetime impact of the households interaction with the public pension system. From the viewpoint of the existing (native) residents of the country, this emigrant confers a fiscal benefit by adding more to the revenue side of the fiscal system than the burden imposed on the expenditure side. The immigrant produces a "net fiscal benefit" to the existing population of the country. The magnitude of the net fiscal benefit that immigrants produce vary from country to country, as is apparent from the estimates in Wildasin (1999) and Kotlikoff and Liebfritz (1999). The latter authors summarize findings on generational accounts for 17 different countries, including both developed and developing countries. For Germany and France, the present value of net fiscal contributions that would be made by a 25-year-old immigrant who is economically similar to existing residents would be in excess of $300,000 (1995 dollars). For Denmark, Sweden, the Netherlands, and Belgium, the corresponding figure lies between $200,000 and $300,000, for a few EU countries (Norway, Italy) this figure is less than $200,000 and, in one case, that of Portugal, the figure is only about $85,000.

3.2 Differential Fiscal Impacts: By Type of Migrant and By Type of Pension System

While it may seem natural to focus on the fiscal impacts of "representative" households or immigrants, a migrant's net fiscal impact on a country, whether measured by $NPPW_i$ alone or more comprehensively, depends (a) on the demographic and economic characteristics of the migrant and (b) on the characteristics of the fiscal system – the tax and benefit structure of the public pension system – in country i. For example, $NPPW_i$ is larger – i.e., the net fiscal benefit of an immigrant is smaller – for older immigrants, since they contribute to the public pension system for a shorter period of time before drawing benefits. Since benefits in most public pension systems rise less than in proportion to lifetime contributions, $NPPW_i$ is smaller (more negative) for immigrants with high earnings; that is, the net fiscal benefit to country i from an immigrant is higher, the higher the immigrants earnings. Skilled workers are thus likely to be net fiscal contributors to public pension systems. Illegal immigrants may not be able receive benefits from the public pension system at all (an attempt to draw benefits might lead to deportation) but the employers of such immigrants might still withhold payroll taxes (perhaps on the basis of false documentation provided by the immigrant), in which case $NPPW_i$ is definitely negative: the worker contributes to the public pension system but never receives benefits from it. At least from the perspective of the public pension system, the net fiscal benefit from such an immigrant is definitely positive, even if the worker has rather low earnings. To take still one more example: since life expectancy is significantly affected by nutrition

and disease in early childhood, immigrants from poor countries have lower life expectancies than those from rich countries. Holding other immigrant characteristics (including earnings) constant, $NPPW_i$ would be lower for immigrants from poor countries than for those from rich countries, i.e., the net fiscal benefit of immigrants from poor countries would be greater than that for immigrants from rich countries, other things the same.

The same immigrant can have quite different net public pension wealth in different countries. For instance, suppose that the public pension system in country i is "Bismarkian" in the sense that benefits depend positively on earnings whereas the system in country j is "Beveridgean," that is, benefits are relatively uniform regardless of earnings. Other things the same, for a high-earnings individual, $NPPW_i > NPPW_j$, that is, a high earner would benefit more from, or suffer less from, the system with earnings-dependent benefits. The reverse would be true for a low-earner. As a further example, suppose that a countrys public pension system is changing over time and that this is anticipated by households. For instance, in view of the data described above, one might anticipate that public pension benefits will be falling over time for many West European countries, while taxes may be rising. These changes reduce $NPPW_i$ for all households, increasing the net fiscal benefit of immigration to existing local residents.

There are of course many conceivable types of immigrants, and the immigration flows that actually occur result in a mix of diverse types of immigrants. The preceding remarks indicate the net fiscal benefit (or cost) of immigration for the existing residents of a country depends not only on the total number of immigrants but on the *composition* of the immigrant flow. For this reason, it can be misleading to speak of *the* impact of immigrants on a public pension system. Furthermore, the *differential* fiscal impacts of *different types* of migrants mean that policies that selectively or differentially affect migration flows can have quite diverse fiscal implications.

3.3   Toward a More Complete Picture

Public pension systems well illustrate how migration affects both the revenue and the expenditure sides of the fiscal accounts and how the fiscal impact of immigration may occur over many periods, with immigrants possibly making net fiscal contributions in some periods and imposing net fiscal burdens in other periods. The impact immigrants on pension systems also depends on the characteristics of the immigrants and on the characteristics of the fiscal system.

These remarks are more broadly applicable to the analysis of the impact of migration on fiscal systems. The parallel with public pension systems is particularly obvious in the case of public-sector health expenditures, the benefits of which are closely linked to age and which, like public pensions, are often financed by taxes on working populations. But these observations apply generally when considering the totality of the interactions between an immigrant and a countrys fiscal system. In principle, one could ascertain the full fiscal impact of immigration by particular types of immigrants in a particular country by analyzing all of the ways in which they interact with the fiscal system over the entire period of their residence. This would, however, require knowledge not only of immigrant characteristics and how they change over time (e.g., changes in earnings, employment, and health over the life cycle) but of the characteristics of the fiscal system and how they

change over time (e.g., changes in tax rates, expenditures, and regulations affecting public expenditure programs and tax systems).

Public pension and health programs are by no means the only important elements of the fiscal systems of rich countries that are sensitive to migration. The revenue flows from virtually all types of taxation, whether based on consumption, income, or wealth, depend crucially on both the size and the socio-economic composition of the population to which they are applied. For example, the revenue impacts of immigration are highly sensitive to the current and future income and wealth of immigrants. One important illustration will suffice. The top 0.2% of US taxpayers – those at the very highest income levels (in excess of $1 million) – account for some 25.2% of income tax revenues, amounting to more than $775,000 in annual taxes paid per taxpayer (US Treasury (2007)).[11] Since there are only about 175,000 such taxpayers, an increase or decrease in their numbers by, say, 80,000 would have profound consequences for the US fiscal system, resulting in swing of total personal income tax revenues of as much as 10% (cet. par.). To anticipate later discussion, it is evident from this example that "not all immigrants are created equal" from a fiscal perspective. Among other implications, it is easy to see why *gross* as well as *net* migration can be of great importance fiscal systems: an outflow of 80,000 high-income taxpayers and their replacement by an equal number of poor immigrants would drastically worsen the flow of revenues to the US Federal government (not to mention the subnational governments). Similar remarks apply, but with less force, to taxes that are less progressively distributed.

The effects of demographic change in relation to debt warrants explicit mention as well. Outstanding debt (i.e., explicit government debt) amounts to 50–100% of GDP for most rich countries. The obligations of debt service fall on future taxpayers, especially those with high incomes. Reductions in fertility (especially by well-educated households with high lifetime incomes), if accompanied by increases in immigration (especially of well-educated immigrants with high lifetime incomes), will shift future tax burdens away from native populations and their descendants toward immigrants and their descendants.

Because immigrants and fiscal systems are diverse and ever-changing, it is difficult or impossible to arrive at definitive assessments of "the" fiscal impacts of immigration. However, in addition to the generational accounting analyses mentioned above, a growing number of recent studies shed significant light on this topic. For instance, Hansen and Lofstrom (2001, 2003) observe that while immigrants (the foreign born) account for about 10% of the Swedish population, they are the recipients of about 30% of welfare expenditures. Moreover, "refugee" immigrants have much lower employment and much higher (and persistent) welfare participation rates than immigrants from other Nordic countries, and these differences are quite persistent over time (Hansen and Lofstrom (2001)). This means, of course, that refugee immigrants pay relatively little in taxes, in addition to imposing high costs on the public sector. For Sweden, it is clear that not all immigrants are the same, from the fiscal perspective: the *composition* of the immigrant flow is a matter of great importance in assessing the fiscal impact of migration. Riphahn (1998) reports generally similar findings for Germany, emphasizing that there, too, welfare expenditures on behalf

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[11]It may be amusing to note that many of these taxpayers are literally worth more to the fisc than their weight in gold: at current prices ($900/oz.), an average adult male's weight-equivalent (190 lbs.) of gold is worth around $2.7 million. Under conservative assumptions about life expectancy and discount rate, the present value of taxes paid by very high income taxpayers can easily exceed this amount.

of immigrants account for a very large share of total expenditures.[12] Wadensjö and Orrje (2002) present a very comprehensive assessment of the fiscal impacts of immigrants in Denmark, distinguishing again between immigrants from less developed and more developed countries and closely analyzing both tax and expenditure impacts of immigration over the life cycle. These authors also find that immigrants from poorer countries pay less in taxes and receive more in benefits than other types of immigrants.

By contrast, Collado and Iturbe-Ormaetxe (2004) find that immigrants to Spain – including recent immigrants from relatively poor countries – have employment rates as high as or higher than those of natives and earnings that are roughly 75% of the native level. They estimate that expansion of existing immigration flows, assuming that "marginal" immigrants are similar to existing immigrants, would have net positive fiscal impacts. Comparing results for the US presented by Auerbach and Oreopolous (2000) and Gustman and Steinmeier (2000), who find that immigrants have only a modest fiscal impact, Collado and Iturbe-Ormaetxe note that human capital and earnings differentials between natives and recent immigrants in the US is substantially larger than is the case for Spain, reflecting the characteristics both of native populations and of immigrants.

4 Competition for Mobile Labor: Why and in What Form?

This section explores some of the potential implications of international labor mobility for policy adjustment. The focus is mainly on the adjustment of fiscal and migration policies in rich (i.e., destination) countries, using a no-migration benchmark as a reference case. The third part of the section, however, explores the implications of global competition for skilled labor for human capital investment, both in rich and in poor (i.e., origin) countries.

4.1 Margins of Fiscal Adjustment: No Migration

As a matter of arithmetic, rich countries will have to make policy adjustments during coming decades in order to deal with intergenerational fiscal imbalances. Leaving migration aside momentarily, there are only two fundamental margins of fiscal adjustment: reductions in public expenditures or increases in revenues. Through the use of debt and other fiscal policies, these adjustments may be distributed over time and across generations in many ways. To facilitate the analysis of migration and fiscal adjustment, it is helpful, as a benchmark, to review the range of policy options in the absence of migration.

Most obviously, fiscal imbalances in key age-related expenditure programs such as public pension and health systems can be managed by reductions in health and retirement benefits or by increases in taxes on working populations. These reforms could be achieved relatively uniformly, by scaling down all existing benefits and scaling up all existing taxes, or they could be more selectively, for instance by cut benefits or raising taxes more for those with higher incomes.

Changes in other elements of the overall fiscal system may also be used to manage fiscal

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[12]In the US, non-natives account for about 18% of participants in Food Stamps, AFDC/TANF (C. Bollinger, personal communication), and Medicaid and (at 11% of the population) are thus overrepresented in the population of social benefits recipients, though to a lesser degree than in the EU countries just mentioned. See also Bollinger and Hagstrom (2003, 2004.

imbalances, too, effectively, if sometimes implicitly, reducing benefits or increasing taxes for different socio-economic or age groups. For instance, the funding of retirement systems could be augmented with revenues from other parts of the tax system (i.e., from "general" funds) in addition to payroll taxes. By comparison with increased payroll taxes, higher levels of consumption-based taxation (like VATs) would shift fiscal burdens toward the old, including the retired population, and would effectively reduce their retirement benefits. Taxes based on non-human wealth or the return to non-human wealth (like comprehensive personal income taxes) would also shift burdens toward older generations relative to a payroll tax. Reductions in public expenditures other than retirement-related programs (general social assistance, unemployment, education, and infrastructure) would shift fiscal burdens toward younger age cohorts. At a basic level, the fungibility of fiscal resources implies that age-related fiscal imbalances may be managed by revenue increases or expenditure reductions throughout the entirety of the fiscal system. Furthermore, these adjustments may occur rapidly, but, through the use explicit and implicit government debt, they may also be partially deferred and thus distributed across generations extending further into the future.

The laws of fiscal arithmetic dictate that some combination of these adjustments must take place, defining a menu of policy options. How the political process will ultimately select among these options is difficult to determine. Nevertheless, different models of the political economy of policymaking over time, even if not definitive in their predictions, offer some indications of the forces at work.

First, simple voting models, in which sheer numbers can be decisive, suggest that growing numbers of elderly voters could gain increased or even complete control of the political process, maintaining or even raising public pension benefits while insuring that the cost of insuring these benefits is shifted to some other population group (younger workers, principally). The political power of the elderly, it would seem, can hardly weaken substantially as they grow more numerous. On the other hand, voters in any age group have diverse characteristics and preferences and do not vote uniformly. Also, different interest groups or factions can influence policymaking not only through their impact on voting but through the expenditure of resources on lobbying and pressure-group politics.

However political interests are represented and expressed, it is important to recognize that public expenditures and taxes are not lump-sum in nature and are therefore subject to those who benefit from a policy are subject to diminishing marginal benefits and rising marginal costs. In simple "reduced form" models of the political process (e.g., Becker (1983, 1985)), observed (equilibrium) policies reflect a balance or tradeoff among contending groups. Distortionary taxes that give rise to an increasing "marginal cost of public funds" can help to explain the limits on majoritarian redistribution at a point in time (e.g., Meltzer-Richard (1981)) or across generations (Barro (1979), Wildasin (1990, b)).[13]

To illustrate, consider a simple overlapping generations model with a two-period life-cycle in which the utility of retirees (the old) depends only on their own consumption while the utility of the working population (the young) depends on their consumption in each period (c_1 and c_2), their leisure (ℓ), the level of education provided to their children (e), and other public goods z, as represented by a life-cycle utility function $u(c_1, c_2, \ell, e, z)$. The

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[13]As Mulligan (2001) observes, normative analyses of the optimal structure of second-best policies (e.g., in the tradition of Mirrlees (1971)) can thus provide important insights into the equilibria of political economy models.

public sector provides cash transfers to the elderly as well as education for the young, and assume for the moment that the government finances incremental expenditures through pay-as-you-go changes in taxes on the earnings of young workers.[14]

Under these assumptions, one can calculate the change in the welfare for a young household resulting from an incremental change in the level of public-pension benefits. If leisure is a normal good and if the wage and income elasticities of labor supply are not directly affected by demographic changes, one can show (see Wildasin, 1990, b) that a decrease in the number of working households relative to the number of retirees reduces the net benefit (or raises the net cost) to young workers of a marginal increase in public-pension benefits. In particular, if young workers are harmed by an expansion of public-pension benefits, they are harmed *more* when they are less numerous, relative to the retired population. If their political influence (through voter turnout, lobbying, or other channels) depends on their intensity of preferences, then aging of the population reduces the equilibrium level of public-pension benefits per retiree. Similarly, a marginal increase in education spending benefits young workers (*i.e.*, parents) less, or harms then more, when there are relatively more elderly retirees in the society. The underlying logic is the same: an increase in the number of elderly, *cet. par.*, requires higher public pension expenditures, raising the shadow value of public-sector revenues and thus the cost, at the margin, of incremental public spending of any kind at all.

This discussion has assumed that incremental changes in public spending are financed through contemporaneous changes in taxes on the earnings of young workers. There are of course other financing possibilities, notably including deferral of taxes through incremental deficit financing. The development of a fully-specified model of intergenerational political equilibrium goes beyond the scope of the present analysis, but intertemporal tax-smoothing considerations imply that distortionary earnings taxes will be utilized in all periods. Thus, an increase in the proportion of elderly in the population, which raises political pressures to limit spending financed by the current young generation, would also be expected to result in some shifting of taxes to future generations through an increase in borrowing.

In summary, population aging and associated financial stresses on the public pension and health systems are expected to lead to adjustment along virtually all margins of fiscal policy. As total pension and health expenditures on benefits for the aged increase due to aging of the population, the shadow value of public-sector resources rises. This creates incentives to raise revenue yields from all sources and to reduce expenditures of all kinds, spreading the fiscal impact of an aging population throughout the fiscal system. Higher government borrowing and reduced spending on education and infrastructure offer additional degrees of freedom for fiscal adjustment, shifting some of the fiscal costs of an aging population forward to future generations.[15]

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[14]In other words, *changes* in public-pension benefits or in education spending are not financed by *changes* in government net liabilities, a policy experiment that thus abstracts from changes in government debt policy. In this model, "taxes on the earnings of the young" could represent payroll or income taxes, or, with careful interpretation, taxes on consumption like VATs.

[15]Models of intertemporal tax smoothing highlight the gradual adjustment of taxes (and, implicitly, of other expenditures) in response to fiscal shocks. The financing of World War II through borrowing is the outstanding empirical example. The above remarks similarly treat increased spending on aging populations as a "fiscal shock" that triggers policy adjustments over time. Unlike World War II, the gradual and predictable nature of age-related spending implies significant scope for anticipatory adjustments in fiscal policy. At a deeper level, however, it is interesting to note that the baby boom itself is a demographic echo of World War II. The bulge in age-related public spending associated with the baby-boom generation can thus be viewed as a further lagged fiscal shock triggered by that war.

4.2 Migration and Fiscal Competition: A Simple Model

Let us now return to the potential role of international migration in the context of a process of fiscal adjustment. As is clear from the discussion of previous sections, economic and demographic fundamentals (levels of development and age structures) imply that powerful incentives for immigration from poor to rich countries will persist for at least the next several decades. The level and composition of immigration flows experienced by individual countries will depend on local economic conditions and policies, including direct controls over migration as well as fiscal policies. Nations have incentives to structure these policies so to ease the fiscal adjustment process.

Generational accounting studies show that if immigrants to rich countries have characteristics broadly similar to existing residents, in terms of income or its correlates (education, health, longevity, etc.) and if they immigrate at young ages, then, like native young residents, they provide positive net fiscal benefits to these countries. However, some immigrants might have "better" or "worse" characteristics than natives, and, as empirical analyses show, the fiscal impacts could then be quite different: poorer, lower-skilled, sicker, and older immigrants provide smaller net fiscal benefits to native populations and may impose net fiscal burdens, whereas better educated, wealthier, healthier and younger immigrants bring larger positive fiscal impacts.

Rich countries therefore have incentives to attract some but not all types of potential immigrants, and to retain some but not all types of native residents. To do so, they have several policy instruments at their disposal. First, they may attempt to impose direct controls on migration. Restrictions on emigration are seldom imposed or enforced, so, in practice, direct migration controls usually are limited to constraints on immigration. Although these constraints appear at first glance to be rigid quantitative limits, they can be and in fact are quite flexible, both because the degree of enforcement of any immigration controls is a matter of policy discretion, and because immigration controls can be applied in a "textured" (or discriminatory) fashion, limiting entry for some types of immigrants but not others. Secondly, fiscal policies affect migration incentives, and these policies can also be altered in ways that influence migration. As in the case of direct immigration controls, fiscal policies can be adjusted in many distinct respects, creating the potential to strengthen incentives that attract some types of immigrants while weakening incentives for others. Note that fiscal policies can influence emigration incentives, even though direct emigration controls may be infeasible.

The literature dealing with fiscal competition provides a framework for analyzing the choice of fiscal and regulatory policies, and their interactions, in the face of actual or potential migration.[16] A simple model, based on this literature, can be used to examine some of the key policy questions that arise in the global competition for potentially mobile workers. To begin with, consider a snapshot of an overlapping generations model in a single period, focusing initially on a country that attracts immigrants from abroad.

Suppose that national output is a concave function $F(L)$ of the effective labor force L. Initially, there is a stock L_i^0 "native" workers of type i, where i represents worker attributes, such as skill levels, initial wealth holdings, and other characteristics that affect workers' fiscal treatment. Let the initial effective labor force be defined as $L^0 \equiv \sum_i \alpha_i L_i^0$ where α_i

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[16]See, e.g., Wilson (1999), Wildasin (1998, 2006), and Wilson and Wildasin (2004) for overiews of this literature.

is the effective labor supply of a worker of type i. Workers are young and are assumed to be mobile. (More precisely, *some* but not necessarily all workers are assumed to be mobile.) In addition, there is a fixed population of elderly, who do not work and who are not mobile. In order to focus on the effects of policies on the native population as a whole, assume for simplicity that lump-sum redistribution between old and young native residents is possible so that their net incomes may be aggregated.

Young workers may enter the country from abroad, with M_i the number of immigrants of type i. The total effective labor force, inclusive of immigrants, is then $L = L^0 + \sum_i \alpha_i M_i$. Let τ_i be the net fiscal contribution, in present value terms, made by a worker of type i.[17] National output is paid out partly to immigrants, with $\sum_i \alpha_i M_i F'(L)$ the total gross wages paid to immigrants. Gross wage income for the native working population is $\sum_i \alpha_i L_i^0 F'(L)$ $= L^0 F'(L)$, and total non-wage income, assumed for simplicity to accrue solely to native residents, is $F(L) - L F'(L)$. Thus, ignoring fiscal transfers, the aggregate income of native residents is $L^0 F'(L) + F(L) - L F'(L) = F(L) - (L - L^0)F'(L) = F(L) - \sum_i \alpha_i M_i F'(L)$. Taking the fiscal system into account, the net income of native residents is

$$W = F(L) - \sum_i \alpha_i M_i F'(L) + \sum_i M_i \tau_i.$$

To connect this notation to the previous discussion, observe that immigrants may make positive or negative net transfers to native residents, depending on the values of the fiscal variables τ_i. As discussed above, it is hazardous to generalize about the empirical value of τ_i because of the diversity of immigrants and of fiscal systems. In practice, $\tau_i > 0$ for highly-skilled immigrants earning sufficiently high wages in the above-ground economy since they make large positive net fiscal contributions. Conversely, τ_i may be negative for low-skilled, low-wage immigrants who receive large fiscal benefits from welfare payments or health benefits. If immigrants are prevented from enjoying welfare or health benefits because of administrative restrictions, fiscal discrimination, or illegal status, τ_i could be positive even for low-skilled immigrants. The key point is that τ_i depends on both of the attributes of immigrants themselves and of the entire fiscal system, including taxes, expenditures, and, not least, the regulatory and administrative features of these systems that determine effective eligibility for benefits and effective enforcement of tax obligations. From a policy perspective, τ_i is not empirically given but is rather to be determined. This is the perspective offered by analyses of fiscal competition.

From the viewpoint of native residents, net income W depends on the numbers of migrants of each type and on their fiscal treatment. Suppose that migrants of type i can attain lifetime net incomes of $\bar{w}_i$ in their home countries and that no rich country's policies affect $\bar{w}_i$. In the absence of any restraints on migration, net incomes for migrants in source and destination countries tend toward equality, i.e.,

$$\bar{w}_i = \alpha_i F'(L) - \tau_i, \tag{3}$$

assuming that $M_i > 0$. If direct regulatory constraints on immigration through limitations on employment permits, visas, etc. are feasible and are binding, then

$$\bar{w}_i < \alpha_i F'(L) - \tau_i, \tag{4}$$

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[17]In terms of Auerbach-Kotlikoff generational accounting, this is the present value of lifetime taxes less the present value of lifetime pension benefits and other cash and in-kind transfers.

where in this case the level of immigration is effectively constrained by the regulatory limit $\bar{M}_i$ so that $M_i = \bar{M}_i$.

This simple model illuminates how policies can be used to advance the interests of native residents, as described by the simple welfare indicator W. Note first that $dW/\bar{M}_i = \alpha_i F''(L) + \tau_i > 0$ if $\tau_i > 0$ and if immigration controls are binding. That is, it is advantageous to native residents to relax binding immigration constraints on migrants who make positive net fiscal contributions. Even if $\tau_i < 0$, it is still possible that relaxation of immigration constraints could benefit native residents. If τ_i is sufficiently negative, however, natives would benefit from *tighter* immigration constraints. Within this model, then, there is a rationale for the imposition of binding immigration controls on some types of potential immigrants – those that impose large fiscal burdens. The model also shows why countries have incentives to impose *selective* (or discriminatory) immigration controls, allowing free immigration for those who are net fiscal contributors.

But direct immigration controls are only one margin of policy. The model also shows what fiscal policies benefit native residents. First, note that if immigration constraints are binding, then $dW/d\tau_i = M_i > 0$: the optimal policy is to impose more taxes on immigrants, or to reduce their fiscal benefits, as long as a binding immigration quota is in place (see Sandmo and Wildasin (1999) for more extensive discussion of this issue). An immediate corollary of this result, however, is that direct immigration controls become *irrelevant* (nonbinding) if fiscal policies are optimally adjusted, since immigration controls cannot be binding if τ_i is sufficiently high (i.e., inequality (4) cannot hold for sufficiently large τ_i). Equivalently, binding immigration controls indicate that fiscal policy has not been optimized. These two types of policies are thus highly mutually dependent.

To characterize optimal fiscal policy still more precisely, we may now ask what value of τ_i maximizes welfare for native residents in the absence of direct immigration controls. In the absence of immigration quotas, (3) must hold. It follows that $dW/d\tau_i = \tau_i/F''(L)$, which is negative if $\tau_i > 0$ and positive if $\tau_i < 0$. It follows that fiscal policy is optimized only when $\tau_i = 0$ for all i, that is, net fiscal benefits and burdens should be reduced to zero for all immigrant types.

It is not difficult to incorporate emigration into this model. The same essential conclusions continue to hold: fiscal policies that reduce the number of net fiscal contributors harm native residents, while policies that reduce the number of households imposing net fiscal burdens are beneficial to them. The optimal policy is one that shifts τ_i toward zero for potential emigrants as well as for potential immigrants.

The preceding analysis is based on a highly stylized model. Some of the conclusions based upon it continue to hold, even when some assumptions are relaxed, while other elements of the model are more critical. For example, suppose that immigrants cannot migrate at zero cost, but must instead incur some migration cost c. The incorporation of migration costs has an impact on the amount of migration that occurs but has no effect on the basic insights of the model. (This is easily seen by noting that introducing a migration cost c is formally equivalent to raising the value of the parameter $\bar{w}_i$ by the amount c.) It can be argued, however, that migration (a *flow*) is a kind of stock-adjustment process, and that migration costs are properly modeled in an explicitly dynamic setting. In a model that allows for sluggish dynamic adjustment because of mobility costs, many of the key qualitative insights derived above continue to hold, but some must be modified

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quantitatively (Wildasin (2003)). In particular, the optimal fiscal burden on an imperfectly mobile resource may not be zero, but positive, and proportional to the speed with which the stock of the resource adjusts to changes in its net rate of return. A factor that responds very rapidly – highly liquid financial assets would be an example (see Huizinga and Nicodème (2004)) – would optimally bear a zero net fiscal burden. But it may be optimal to impose significant fiscal burdens on resources whose stocks respond only sluggishly. Some types of labor and fixed capital investments could thus face significant fiscal burdens – up to and including confiscatory burdens, if these are feasible.

To summarize, competitive pressures provide incentives for governments to adjust tax and expenditure policies in ways that are "favorable" to resources that they seek to attract and "unfavorable" to resources that they wish to repel. In the simplest cases, this would mean, for instance, cutting income taxes on the rich or reducing welfare benefits for the poor. In a pure limiting case, fiscal policies would collect revenues from all households in accordance with the cost of providing public services to them, that is, no potentially mobile households would impose net fiscal burdens or be net fiscal contributors. This of course does not in any way imply that taxes would approach zero, any more than competition among firms implies that prices approach zero. Rather, competition for mobile households would reduce cross-subsidies or redistribution among households by bringing taxes (and public-sector prices) into close alignment with the costs of whatever levels of public services are provided. Limiting cases are not to be taken literally, of course. The general conclusion to draw from analyses of fiscal competition is that competitive pressures are likely to constrain fiscal policies, in the direction of reduced redistribution, for resources that are relatively highly mobile. In reality, neither the international movement of people and the adjustment of fiscal policies occur instantaneously. The adaptation of fiscal systems to international mobility, like their response to the aging of the population, is sure to be a gradual process.

4.3   Margins of Fiscal Adjustment with Migration

Let us now consider in more detail how age-imbalanced societies may adjust their fiscal and other policies, taking into account the potential for international migration.

Reform of Public Pension and Health Systems. For countries with large underfunded systems of pension and health benefits for the old, young workers with high lifetime earnings prospects are fiscally attractive. Workers at mid-life with high current earnings and good health would also be net fiscal contributors to such systems. Others, however, would make only modest contributions or could add net fiscal burdens. At a time of fiscal stress, policy reforms that shift fiscal burdens away from desired immigrants and that shift benefits toward them would encourage fiscally-favorable migration flows, while policies that work in the reverse direction would discourage them.

First and most obviously, benefit reductions at the expense of the current old population, by reducing the need for taxes on working populations, would help to attract and retain young, high-skilled workers. "Private accounts" or other reforms that reduce the amounts of transfers from young to old would have a similar effect. Caps on the maximum amount of annual "contributions" to the public pension system and health systems or closer linkages between benefits and earnings, which limit *intragenerational* redistribution within these

systems, also work in the same direction. The net fiscal benefit to a country of immigrants of any type would tend to converge under such reforms, as poor immigrants are *more* attractive when the benefits that they receive are reduced, whereas rich immigrants are *less* attractive when the benefits that they receive are made more generous.

However, while benefit reductions would help to restore fiscal balance without imposing added burdens on young and highly-skilled immigrants, competitive pressures are by no means the exclusive determinants of fiscal policies. In countries with rapidly aging native populations and immigration of young workers, rapid reductions in pension benefits which harm existing retirees or those about to retire, are disproportionately burdensome to native residents. By contrast, tax increases would shift more of the burden of public pension adjustment onto immigrants rather than natives. In EU countries, voter participation rates (and rates of political participation generally) are considerably higher for natives relative to immigrants.[18] Given that there are already substantial immigrant populations in these countries, political pressures might well favor tax increases rather than benefit reductions because the former places more of the burden of fiscal adjustment on immigrants relative to natives.

Thus, whereas competition for internationally-mobile workers would create incentives to address fiscal imbalances in public pension and health systems through benefit reductions, native residents may also be able to shift fiscal burdens to existing (and imperfectly mobile) immigrant populations through higher taxes. An important open question for students of political economy is the relative importance of the market environment – in this context, the mobility of labor – in influencing the political process in favor of a group – current and prospective immigrants – who may not have the franchise and who generally have relatively little representation in the political process. The adjustment paths followed by countries with underfunded old-age social insurance systems will shed light on the value of the franchise and the impact of market constraints on political decisionmaking.

Migration Policy. As noted above, immigration controls can be and sometimes are used to achieve selective migration incentives, for example to facilitate immigration by those with high levels of education, high levels of wealth, or other desirable characteristics. Restrictions on immigration based on country of origin can provide a complementary policy instrument. The US and Canada already have such policies in place.

In Western Europe, membership in the European Union limits the extent to which individual countries can impose such controls on citizens of other EU countries; freedom of movement is one of the basic rights of EU citizens. As a practical matter, the absence of internal border controls also constrains the ability of any one country to limit immigration by non-EU citizens since such immigrants, once admitted to the EU, can move relatively freely among EU countries. Of course, free internal migration (and capital movements) can provide substantial benefits to the residents of any large region – the US, Canada, or the EU – by facilitating the market-directed movement of workers from low- to high-productivity employment, raising output and incomes.[19] The prospect of such gains helps

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[18]For example, a recent survey of voting participation in European countries found that 73% of native residents voted in the most recent national election, whereas only 36% of immigrants voted (European Social Survey (2004)). In part, this reflects varying levels of eligibility to vote: 33% of immigrants were not eligible to vote, in contrast to only 6% of natives. However, even among those eligible to vote, turnout rates were much lower for immigrants (about .5) than for natives (about .75).

[19]In this context, it is important to note that *gross* rates of internal migration commonly exceed *net* rates by an order of magnitude, even at large geographic scales, and have done so for decades. Although (to this author's knowledge) no

to underpin the commitment to the principle (if not always the practice) of free internal labor mobility, deeply embedded in EU institutions (along with the principle of free internal trade) since its inception.

Limited barriers to internal migration within the EU mean that the level of enforcement of border controls by any one EU country has important spillover effects on other EU countries, presenting a potential free-rider problem. If external border controls are effectively enforced, then the EU countries can collectively limit the inflows of older, low-skilled, unhealthy, or otherwise fiscally less-attractive migrants. On the other hand, countries that fail to enforce external border controls have the potential to create significant fiscal burdens on other EU countries toward which such migrants would especially be likely to move. The instances cited above concerning the high welfare participation rates of poor migrants in Sweden, Germany, and Denmark illustrates the potential difficulty that a common border may create. (Italy and Spain are often characterized as conduits to the EU for illegal immigrants from third-world countries.)

Similar issues arise in the US vis-a-vis state governments. The fiscal implications are far different in the US, however, since state governments account for a very modest share of the redistributive transfers undertaken by the public sector; in the EU, almost all redistributional activities are undertaken at the level of the nation rather than at the level of the EU proper. Lax enforcement of border controls by some EU countries strengthens competitive incentives to limit social benefits for the poor. In principle, these competitive pressures could be eased by coordinated commitments by EU member states to redistributive transfers, to effective border enforcement, or both. Such coordination is not easily achieved, however. "Upward reassignment" of responsibility from EU member states to the EU itself – for redistribution, border controls, or both – offers a potential alternative institutional mechanism for limiting fiscally burdensome immigration.

The Withering Away of the Welfare State? Large flows of migrants from poor to rich countries testify to the mobility of relatively poor and low-skilled people. Many empirical analyses, especially of internal migration in countries like the US and Canada, show that skilled and well-educated people are also highly and even disproportionately mobile.[20] In addition to their public pension and health systems, which transfer resources across generations, the fiscal systems of modern rich countries also redistribute resources from rich to poor. For these countries, poor immigrants (or residents) impose large fiscal burdens while the rich make large fiscal contributions. The world's stock of skilled workers constitute a valuable resource for which rich countries have incentives to compete, while low-skilled workers represent potential fiscal burdens (or more modest fiscal contributions). The extent to which tax and expenditure systems capture resources from those at the high end of the skill distribution and transfer them to those at the low end influences the attractiveness of different countries for different types of migrants.

Competition for mobile labor may create political pressures for reduced redistribution through the fiscal system. Symmetrically, reductions in the amount of fiscal redistribution may reduce political pressures for immigration controls – specifically, for limits on the immigration of poor and unskilled migrants. In earlier (pre-twentieth century) eras

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estimates have yet been made of the productivity impact of *gross* migration flows within the US or Canada, the continuous inter-regional movement of workers, especially highly-skilled workers, is clearly an important part of the mechanism through which human resources are matched to employment opportunities. See Wildasin (2005) for further discussion.

[20]See, e.g., Kodrycki (2001) and Bound et al. (2001) for recent examples and additional references.

of migration, the "welfare state" did not yet exist, and most of the gains and losses from migration accrued to or were borne by migrants themselves. The distribution of the fiscal impacts of migration is very different in an economy where public revenues and expenditures approach one-half of GDP. In such societies, important economic impacts from migration are transmitted through the fiscal system to the rest of the population, which thus has a strong incentive to limit "unfavorable" migration, if possible. If fiscal redistribution diminishes, whether because of competition for mobile resources or otherwise, the fiscal payoff to the regulation of migration diminishes, and liberalization of migration policies would become politically more attractive.[21]

Capital Tax Competition. Personal income taxes provide an opportunity, if desired, to tax capital as well as wage income at the household level and to do so with a progressive rate structure. This means that a household's incentive to reside in a country – household locational choices – may depend on the taxation of capital income. To attract high-income households, a country could limit the taxation of capital income by maintaining a flat rather than progressive rate structure, by relying relatively little on personal income taxes and relatively more heavily on other types of taxes (such as payroll taxes), and by providing opportunities to escape taxation by rich households through tax shelters or special tax provisions that reduce effective tax burdens on capital. Since immigrants are relatively more highly represented in younger age cohorts, a disproportionate share of capital income accrues to natives at present. Relatively heavy current taxation of capital income at the household level might thus be an attractive feature of a tax system if competition for mobile labor creates pressures to limit tax burdens on young mobile workers. Over time, however, immigrants can be expected to move up through the age distribution, acquiring an increasing share of capital and capital income within the country in the process. Heavier effective taxation of capital income would not deter entry by such immigrants if these taxes are expected to fall in the future. If high current taxes signal high taxes in the future, however, then the opposite would be true.[22]

Capital income can also be taxed on a source basis, for instance through corporation income taxation. There is an extensive literature that examines source based taxation of capital income when capital is mobile but labor is not. Suppose, however, that both labor (or at least young people) are mobile. The complementarity of labor and capital in production then implies that they tend to move together – in fixed proportions, in the extreme case where capital and labor are perfect complements, but at least to some degree, in less extreme cases. Fiscal policies inherit this complementarity. For instance, investment subsidies that attract capital also increase the demand for labor, and taxes on workers affect not only the locational choices of labor but the flow of capital as well. In the polar case of perfect complementarity, labor and capital constitute a bundled composite input and only the fiscal treatment of the entire bundle, rather than its component parts, would be relevant for migration/capital flow incentives.

This complementarity – of inputs, and of fiscal policy – is often used to justify local economic development/investment incentives on the grounds that they increase the local

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[21]Recent analysis by Hanson et al. (2005) indicates that public opinion toward migration is less favorable in US states that provide generous transfers to the poor financed by heavier taxes on the rich.

[22]Analogous issues arise with respect to value-added taxation. Falling VAT rates over time are roughly equivalent to declining taxation of capital income, implying relatively high taxes on old residents and lower future taxes on those who are currently young. A policy of falling VAT rates, if anticipated, could encourage capital accumulation and immigration by young workers who expect to accumulate capital over time.

local employment, wages, or both. In the long run, such policies increase the incentives for workers to migrate to locations with investment-promoting fiscal policies. At the international level, the recent experience of Ireland may be cited as one possible example of such a process. A favorable investment climate in Ireland is argued to have contributed to that country's rapid economic growth and an accompanying dramatic reversal of migration flows: Ireland, which for long parts of its history has been an emigration country, has recently experienced a high level of immigration which, in turn, has helped to sustain the economic expansion (see Figure 5, Barrett et al. (2000), and Barrett (2002)).

These remarks suggest that intensified fiscal competition for *capital investment* might be one facet of a process of fiscal competition for mobile workers. Most theoretical and empirical research on fiscal competition has focused on competition for a single mobile resource, and – with some noteworthy exceptions – has not yet addressed the simultaneous determination of the fiscal treatment of multiple mobile resources through multiple fiscal instruments. This is an area of ongoing research.[23]

Other Fiscal Policy Margins. To take one final example of a possible margin of policy adjustment, consider the relationship between monetary and fiscal policy. High fiscal deficits create pressures for (non-independent) central banks to monetize government debt. One response to the problem of funding public pensions would be for fiscal authorities to rely on debt financing of pension benefits which could then be accommodated by expansionary (and possibly inflationary) monetary policy. A desire to avoid such outcomes is presumably the underlying rationale for the fiscal criteria imposed on members of the EMU: fiscal discipline enhances the prospects for a credibly independent ECB. However, low fertility rates could make it increasingly difficult for EU countries to adhere to the EMU fiscal criteria because of the problem of public pension funding.

Expansionary monetary policy at the EMU level, on the other hand, could contribute to higher output, tighter labor markets, and lower unemployment in the EU countries. This in turn would raise the demand for immigrants and would contribute to increased inflows of younger workers. This could constitute yet one more margin of policy adjustment through which low fertility, the aging of the European populations, and associated financial stress on public pension systems is partly addressed through increased migration.

4.4 Global Inequality and Human Capital Investment

The time horizon for adjustment of policy in response to population aging is long. Over such a horizon, the global stock of skilled workers can and will change. If fiscal policies in rich countries adjust in ways that raise the net incomes of highly-skilled young workers, the incentive to acquire skills will rise, both within these countries and throughout the world. As noted in the original "brain drain" literature (e.g., Bhagwati and Partington (1976)) the migration of skilled workers from poor to rich countries can deplete valuable human resources from the former. To the extent that the returns to human capital investment in

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[23]Authors such as Bucovetsky and Wilson (1991) and Keen and Marchand (1997) have discussed the implications of fiscal competition for the mix of taxes and for the composition of public expenditures, focusing on the case where there is only a single mobile factor of production. Wilson (1995) explicitly considers the case where both labor and capital are mobile, showing how competition for these resources affects equilibrium fiscal structures. Redoano (2004) presents an initial empirical analysis of fiscal interactions among EU countries. Wildasin (2004) investigates how the degree of factor mobility (measured by dynamic speeds of adjustment to changes in policy) can affect the structure of a fiscal regime.

poor countries accrue to other nations, the incentives to devote public-sector resources to education may diminish. On the other hand, the incentive to devote private resources to education presumably rises: for students or their families, education provides an opportunity to work in rewarding environments, whether within the home region or elsewhere. Improved opportunities elsewhere, i.e., participation in the global market for skilled labor, raises the *private* return to education. Indeed, the well-documented persistently high rates of internal migration for highly-educated workers in the US and Canada illustrates that the option to migrate is frequently exercised, which is to say that the incentive to invest in education would be diminished, in these countries, if migration options were restrained.

Global competition for skilled workers, then, should raise the private rate of return to, and thus demand for, investment in human capital. For the rich countries, reductions in the amount of fiscal redistribution, to the extent that they occur, should raise the "net" education premium, i.e., the real income differential, net of all taxes and transfers, between skilled and unskilled workers. Supply response to rising demands for human capital investment can occur either through the private sector (purely private education), through the public sector (purely public education), or through a mix of the two (e.g., loans, tax relief, and other fiscal support for education that may take place partly at private institutions, and increased reliance on tuition and fees to finance education at public institutions). Public-sector support for education is frequently justified on the grounds that young people or their families face liquidity constraints that limit their ability to invest in human capital, a constraint that is presumably more severe in poor than in rich countries. Young people from poor countries now acquire skills and education both at home and abroad; rich countries at present provide significant public support for the advanced education of students from poor countries, resulting in part in return migration of newly-educated workers to the latter (a reverse brain drain) but also facilitating the retention of some portion of recent graduates. Age-related fiscal stresses in rich countries thus give rise to complex interactions with the financing of education both in rich and in poor countries. In the former, an increase in the proportion of domestically-trained skilled workers can produce a fiscal dividend, but public expenditures for education are likely to be constrained by the rising marginal cost of public funds over time. In the latter, the international mobility of skilled workers limits the return to *public* investment in education even as it raises the *private* return, presumably giving rise to incentives to shift toward increased reliance on private financing where the means to do so can be found.[24]

5   Conclusion

Extensive research by economic historians (O'Rourke and Williamson (1999) and numerous references therein) reminds us that "globalization" is not a new phenomenon. The experience of the 19th century demonstrates that international linkages – particularly the international movement of labor and capital, but also international trade – can have profound effects on economic growth and on the distribution of income within and among countries. International migration and capital flows today, like those of earlier eras, is driven by the desire of people to relocate themselves (through migration) and their re-

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[24]For further discussion of the implications of labor mobility for investment in human capital, see, e.g., Wildasin (2000), Poutvaara (2001), Andersson and Konrad (2001, 2003), and Thum and Uebbelmesser (2003).

sources (through capital flows) to locations with greater economic opportunity and higher economic returns.

While "globalization" is not a new phenomenon, there are some new things under the sun. In the realm of demography, we now witness fertility rates well below replacement rates in large regions, a situation without historical precedent. Low fertility rates and rising life expectancies must, in themselves, have important impacts on labor markets and fiscal systems in rich countries. Intergenerational transfers of historically unprecedented magnitudes in these countries give rise to tight linkages between demographic and fiscal conditions. Large international fertility *differentials* imply internationally unbalanced population age structures, coupled with large and persistent real income differentials between high-fertility and low-fertility regions, have created powerful incentives for international migration.

For these reasons, the economic impacts of "globalization", and especially the integration of markets for labor and capital, differ in important respects from previous experience. International capital flows have received a great deal of attention in the public economics literature dealing with factor market integration and fiscal competition. The lion's share of public sector expenditures and revenues are closely linked to population, however, and the implications of international migration are therefore of especially critical importance. Of course, the international allocation of labor and capital are far from unrelated. This linkage means that tax, expenditure, and regulatory policies must be examined with an eye to their effects on *both* capital and labor allocations and flows.

Redistribution of income requires fiscal contributions, and fiscal contributors are scarce resources in societies with extensive redistributive policies. Skilled workers play a vital role in the fiscal systems of advanced economies, and may easily be "worth their weight in gold", bringing fiscal dividends of substantial size to the societies in which they reside. Competitive pressures to attract such contributors is always present, but intensifies as the shadow value of fiscal resources rises. In the context of migration, this competition can take several forms. More favorable fiscal treatment of highly-skilled workers is one instrument at the disposal of governments. On the tax side, more favorable treatment may include reduced progressivity of tax rate structures or increased reliance on consumption taxation (especially through VAT or other commodity-based taxes rather than personal taxation). Highly-skilled workers anticipate high lifetime earnings streams and above-average wealth accumulation, and hence tax burdens on them can be reduced through tax deferral or avoidance devices such as favorable tax treatment of capital gains, stock options, and closely-held business entities. On the expenditure side, competitive pressures favor provision of public goods and services valued especially by highly-skilled workers, and especially by highly-skilled immigrants.

One implication of such fiscal competition is that it tends to erode the fiscal dividends that new highly-skilled workers bring to a society. In the extreme, pure fiscal competition among many nations tends to unravel redistribution among the owners of mobile resources, including skilled workers, at which point the provision of public goods and services is brought into alignment with taxes. This is not, or need not be, a "race to the bottom", either in the sense that it happens rapidly ("a race") or in the sense that taxes and public expenditures are driven toward zero ("the bottom"). On a much smaller geographical scale, protracted competition among local school districts in the US has not produced

identical levels local education spending and taxation, even in the face of extensive state-government fiscal policies aimed at reducing dispersion of local fiscal policies, and the quality – and expense – of some public schools in the US is far from any sort of educational "bottom". Competition does, however, raise the cost of redistribution, even as it may improve efficiency.

Policy competition for skilled workers need not occur only through fiscal policy. Regulatory policies – immigration quotas are the most obvious illustration – can also have a significant effect on migration flows. This type of competition is complementary with fiscal competition. In particular, nations have incentives to ease immigration restrictions on immigrants who produce large fiscal dividends, and to tighten them on immigrants who produce large fiscal burdens. Existing immigration policies in many countries already reflect this principle, in that they contain special provisions for workers with skills in "high demand", who have the resources and intention of starting new businesses, or who in other ways are distinguished by talent, wealth, and good future prospects. Long applicant queues for such workers are evidence that a nation may reap added fiscal benefits from targeted liberalization of immigration restrictions. Lax enforcement of border controls for low-skilled workers offers an opportunity for fiscal discrimination between high- and low-skilled workers.

In this setting, it is important to understand, on the one hand, how immigration can affect the fiscal systems of these countries. At the same time, fiscal policy can affect migration incentives and flows. The discussion above has examined some of the possible mechanisms of policy adjustment that EU and other rich countries may follow as they manage the fiscal stresses imposed by aging populations on their fiscal systems. Public pension reforms are one likely consequence of these stresses. Changes in the taxation of individuals and businesses, the provision of public goods and services, and redistributive transfers, are also likely to play a role in the adjustment of EU fiscal systems to new demographic structures. The competition for mobile labor, in particular, may play an important role in creating incentives for fiscal adjustment. A deep and interesting question is whether existing institutional structures for policymaking are well adapted to the management of such complex, interrelated, and potentially far-reaching policy adjustment and, if not, how demographic pressures may ultimately play a role in shaping institutional change.

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TABLE 1

Fertility Rates and Old-age Dependency Ratios
Curent and Projected, for OECD Countries

	Fertility Rates		Old-Age Dependency Ratios	
	2000	**2050**	**2000**	**2035--2050**
Australia	1.72	1.56	20.4	47.0
Austria	1.31	1.50	25.2	58.2
Belgium	1.54	1.80	28.1	49.5
Canada	1.62	1.50	20.4	45.9
Czech Rep.	1.14	1.50	21.9	57.5
Denmark	1.77	1.80	24.2	40.3
Finland	1.73	1.70	25.9	40.3
France	1.73	1.80	27.2	50.8
Germany	1.40	1.50	26.6	53.2
Hungary	1.30	1.60	23.7	47.2
Italy	1.22	1.50	28.8	66.8
Japan	1.38	1.61	27.7	64.6
Korea	1.71	1.59	11.3	45.5
Netherlands	1.71	1.80	21.9	44.9
New Zealand	1.98	1.90	20.4	48.3
Norway	1.80	1.80	25.6	41.2
Poland	1.34	1.58	20.4	55.2
Portugal	1.53	1.70	26.7	50.9
Spain	1.19	1.50	27.1	65.7
Sweden	1.50	1.80	29.4	46.3
UK	1.72	1.80	26.6	45.3
US	2.05	1.95	21.7	37.9
Unweighted				
Average	1.56	1.67	24.1	50.1

Source: Dang et al. (2001), Tables 1, A.1.

International Migration Rates, Selected OECD Countries
Selected Years, 1988--2005

		1988	1990	1992	1994	1996	1998	2000	2001	2002	2003	2004	2005
Austria													
	Inflow						0.73%	0.81%	0.92%	1.15%	1.20%	1.33%	1.23%
	Outflow						0.55%	0.55%	0.63%	0.48%	0.57%	0.59%	0.57%
	Net						0.18%	0.27%	0.29%	0.67%	0.63%	0.74%	0.65%
	Gross/Net						7.28	5.11	5.3	2.4	2.8	2.6	2.8
	Gross						1.29%	1.36%	1.55%	1.63%	1.77%	1.92%	1.80%
Belgium													
	Inflow	0.39%	0.51%	0.55%	0.55%	0.51%	0.50%	0.67%	0.64%	0.68%	0.66%	0.69%	0.74%
	Outflow	0.33%	0.27%	0.28%	0.34%	0.32%	0.36%	0.35%	0.31%	0.30%	0.33%	0.36%	0.37%
	Net	0.06%	0.24%	0.27%	0.22%	0.19%	0.14%	0.32%	0.34%	0.38%	0.34%	0.33%	0.37%
	Gross/Net	11.9	3.3	3.1	4.1	4.3	6.0	3.2	2.8	2.6	2.9	3.2	3.0
	Gross	0.71%	0.78%	0.83%	0.89%	0.83%	0.85%	1.02%	0.95%	0.98%	0.99%	1.06%	1.11%
Denmark													
	Inflow	0.27%	0.29%	0.33%	0.25%	0.24%	0.23%	0.43%	0.47%	0.41%	0.35%	0.35%	
	Outflow	0.10%	0.09%	0.09%	0.10%	0.11%	0.15%	0.16%	0.17%	0.16%	0.16%	0.17%	
	Net	0.17%	0.20%	0.23%	0.15%	0.13%	0.09%	0.27%	0.30%	0.25%	0.19%	0.17%	
	Gross/Net	2.2	1.9	1.8	2.3	2.8	4.3	2.1	2.1	2.3	2.7	3.0	
	Gross	0.37%	0.38%	0.42%	0.34%	0.36%	0.38%	0.58%	0.64%	0.57%	0.51%	0.52%	
Finland													
	Inflow		0.13%	0.21%	0.15%	0.15%	0.16%	0.18%	0.21%	0.19%	0.18%	0.22%	0.24%
	Outflow		0.02%	0.03%	0.03%	0.06%	0.03%	0.08%	0.04%	0.05%	0.04%	0.08%	0.05%
	Net		0.11%	0.18%	0.12%	0.09%	0.13%	0.10%	0.17%	0.14%	0.14%	0.14%	0.19%
	Gross/Net		1.3	1.3	1.5	2.3	1.5	2.6	1.5	1.8	1.6	2.2	1.5
	Gross		0.15%	0.24%	0.18%	0.21%	0.19%	0.26%	0.25%	0.25%	0.22%	0.30%	0.29%
Germany													
	Inflow	0.83%	1.06%	1.50%	0.95%	0.86%	0.74%	0.79%	0.83%	0.80%	0.73%	0.73%	0.70%
	Outflow	0.46%	0.59%	0.76%	0.76%	0.68%	0.78%	0.68%	0.60%	0.61%	0.60%	0.66%	0.59%
	Net	0.37%	0.47%	0.74%	0.19%	0.18%	-0.04%	0.11%	0.23%	0.19%	0.12%	0.07%	0.12%
	Gross/Net	3.5	3.5	3.1	9.2	8.5	-37.1	14.0	6.3	7.6	10.7	20.8	11.1
	Gross	1.29%	1.65%	2.26%	1.71%	1.55%	1.52%	1.47%	1.44%	1.41%	1.33%	1.39%	1.29%

International Migration Rates, Selected OECD Countries (Cont'd)
Selected Years, 1988--2005

	1988	1990	1992	1994	1996	1998	2000	2001	2002	2003	2004	2005
Luxembourg												
Inflow	2.19%	2.44%	2.50%	2.28%	2.21%	2.49%	2.47%	2.49%	2.44%	2.56%	2.76%	2.97%
Outflow	1.41%	1.44%	1.43%	1.31%	1.35%	1.57%	1.62%	1.71%	1.84%	2.09%	2.40%	2.37%
Net	0.77%	1.00%	1.07%	0.97%	0.87%	0.91%	0.85%	0.79%	0.60%	0.47%	0.35%	0.59%
Gross/Net	4.7	3.9	3.7	3.7	4.1	4.4	4.8	5.3	7.1	10.0	14.6	9.0
Gross	3.60%	3.88%	3.94%	3.59%	3.56%	4.06%	4.09%	4.20%	4.28%	4.64%	5.16%	5.34%
Netherlands												
Inflow	0.39%	0.54%	0.55%	0.44%	0.50%	0.52%	0.58%	0.59%	0.54%	0.45%	0.40%	0.39%
Outflow	0.14%	0.14%	0.15%	0.15%	0.14%	0.14%	0.13%	0.13%	0.13%	0.13%	0.14%	0.15%
Net	0.25%	0.41%	0.40%	0.30%	0.35%	0.38%	0.44%	0.46%	0.41%	0.32%	0.26%	0.24%
Gross/Net	2.2	1.7	1.8	2.0	1.8	1.7	1.6	1.6	1.6	1.8	2.1	2.2
Gross	0.54%	0.68%	0.70%	0.59%	0.64%	0.66%	0.71%	0.72%	0.67%	0.59%	0.54%	0.54%
Norway												
Inflow	0.55%	0.37%	0.40%	0.41%	0.39%	0.60%	0.62%	0.56%	0.68%	0.59%	0.61%	0.68%
Outflow	0.22%	0.23%	0.19%	0.22%	0.23%	0.27%	0.33%	0.34%	0.27%	0.31%	0.20%	0.27%
Net	0.33%	0.14%	0.21%	0.19%	0.16%	0.33%	0.29%	0.23%	0.41%	0.27%	0.41%	0.41%
Gross/Net	2.3	4.3	2.8	3.3	3.8	2.6	3.3	4.0	2.3	3.3	2.0	2.3
Gross	0.77%	0.60%	0.59%	0.63%	0.62%	0.87%	0.95%	0.90%	0.95%	0.90%	0.80%	0.95%
Sweden												
Inflow	0.53%	0.62%	0.46%	0.85%	0.33%	0.40%	0.38%	0.49%	0.53%	0.54%	0.53%	0.57%
Outflow	0.14%	0.19%	0.15%	0.18%	0.16%	0.16%	0.14%	0.14%	0.16%	0.17%	0.18%	0.18%
Net	0.39%	0.43%	0.30%	0.67%	0.17%	0.24%	0.24%	0.35%	0.37%	0.37%	0.35%	0.39%
Gross/Net	1.7	1.9	2.0	1.5	3.0	2.3	2.1	1.8	1.9	1.9	2.0	1.9
Gross	0.67%	0.81%	0.61%	1.03%	0.49%	0.56%	0.52%	0.64%	0.69%	0.70%	0.71%	0.74%
Switzerland												
Inflow	1.13%	1.48%	1.60%	1.29%	1.03%	1.04%	1.20%	1.36%	1.33%	1.23%	1.30%	1.27%
Outflow	0.83%	0.87%	1.15%	0.90%	0.94%	0.82%	0.77%	0.72%	0.68%	0.63%	0.65%	0.67%
Net	0.30%	0.61%	0.45%	0.39%	0.09%	0.22%	0.44%	0.64%	0.65%	0.60%	0.65%	0.60%
Gross/Net	6.5	3.9	6.1	5.7	21.5	8.4	4.5	3.3	3.1	3.1	3.0	3.2
Gross	1.97%	2.35%	2.75%	2.19%	1.97%	1.85%	1.97%	2.08%	2.00%	1.87%	1.95%	1.94%

TABLE 3

Stocks of Foreign-Born Population, Selected OECD Countries
As Percentage of Total

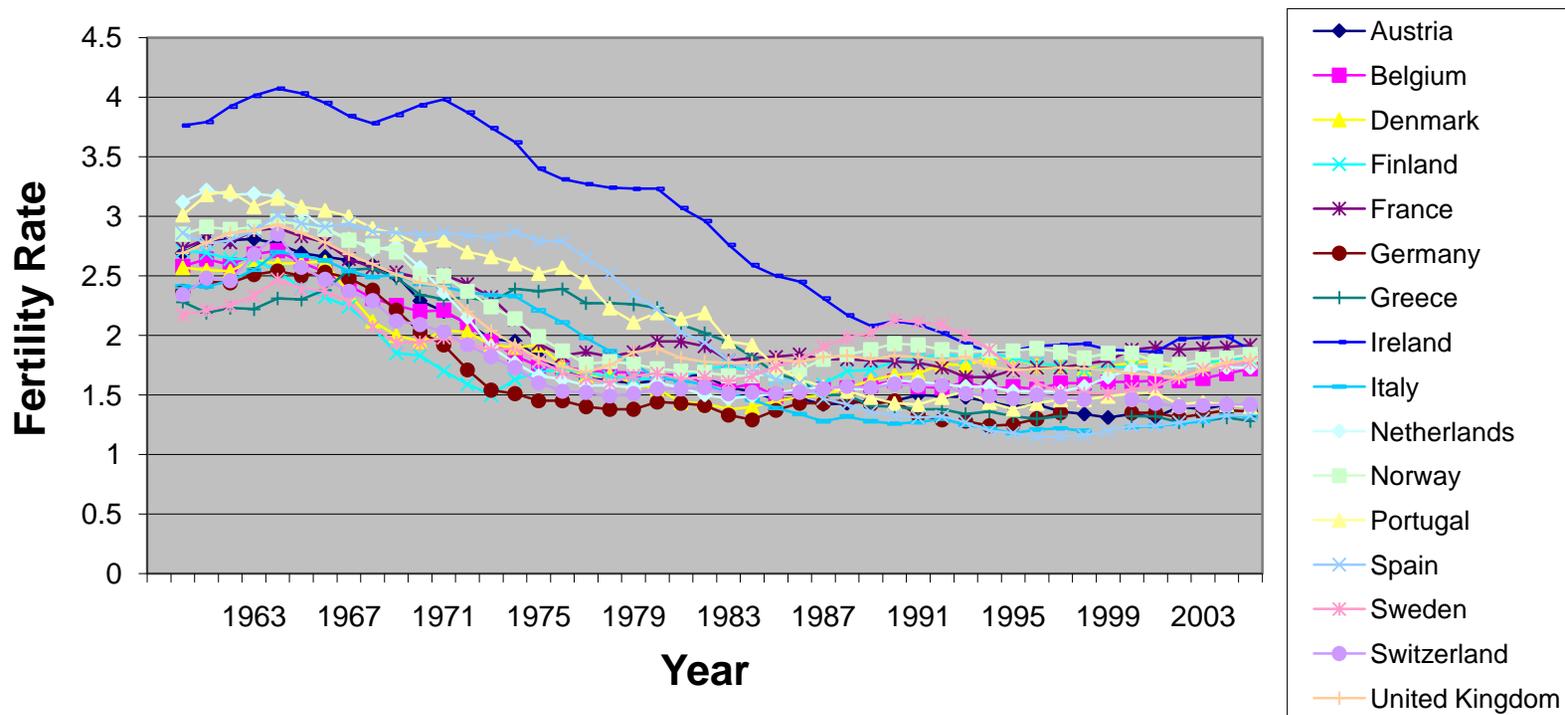|	1990	1992	1994	1996	1998	2000	2001	2002	2003	2004	2005
Austria					11.2	10.5	11.1	10.8	11.4	13.0	13.5
Canada				17.4	17.8	18.1	18.4	18.6	18.7	18.9	19.1
Denmark		4.0	4.3	5.1	5.4	5.8	6.0	6.2	6.3	6.3	6.5
Finland				2.1	2.4	2.6	2.7	2.8	2.9	3.2	3.4
France											8.1
Hungary				2.8	2.8	2.9	3.0	3.0	3.0	3.2	3.3
Greece							10.3				
Ireland				6.9	7.8	8.7	9.3	10.0	10.5	11.0	11.0
Luxembourg				31.5	32.2	33.2	32.8	32.9	33.0	33.1	33.4
Netherlands	8.1		9.0	9.2	9.6	10.1	10.4	10.6	10.7	10.6	10.6
Norway			5.4	5.6	6.1	6.8	6.9	7.3	7.6	7.8	8.2
Sweden		9.6	10.5	10.7	11.0	11.3	11.5	11.8	12.0	12.2	12.4
US	7.9		8.2	10.3	10.8	11.0	11.3	12.3	12.6	12.8	12.9

Source: OECD (1999a), Table A.1.5 (1990 data); OECD (2003), Table A.1.4 (1991-1992 data);
OECD (2005), Table A.1.4 (1993--1995 data); OECD (2007) Table A.1.4 (1996-2005 data).

TABLE 4

Stocks of Foreign Population, Selected OECD Countries,
As Percentage of Total

	1988	1990	1992	1994	1996	1998	2000	2001	2002	2003	2004	2005
Austria	4.5	5.9	7.9	8.9	8.6	8.6	8.8	8.9	9.2	9.4	9.5	9.7
Belgium	8.8	9.1	9.0	9.1	9.0	8.7	8.4	8.2	8.2	8.3	8.4	8.6
Czech Republic			0.4	1.0	1.9	2.1	1.9	2.0	2.3	2.4	2.5	2.7
Denmark	2.8	3.1	3.5	3.8	4.7	4.8	4.8	5.0	4.9	5.0	4.9	5.0
Finland	0.4	0.5	0.9	1.2	1.4	1.6	1.8	1.8	1.9	2.0	2.1	2.2
France		6.3										
Germany	7.3	8.4	8.0	8.6	8.9	8.9	8.9	8.9	8.9	8.9	8.9	8.8
Hungary				1.3	1.4	1.4	1.1	1.1	1.1	1.3	1.4	1.5
Ireland	2.4	2.3	2.7	2.7	3.2	3.0	3.3	4.0	4.8	5.6	5.5	6.3
Italy	1.1	1.4	1.6	1.6	2.0	2.1	2.4	2.5	2.6	3.9	4.2	4.6
Luxembourg	27.4	29.4	31.0	32.6	34.1	35.6	37.3	37.5	38.1	38.6	39.0	39.6
Netherlands	4.2	4.6	5.0	5.0	4.4	4.2	4.2	4.3	4.3	4.3	4.3	4.2
Norway	3.2	3.4	3.6	3.8	3.7	3.6	4.0	4.1	4.1	4.3	4.6	4.8
Portugal	1.0	1.1	1.3	1.6	1.7	1.8	2.1	3.5	4.1	4.3	4.5	4.1
Spain	0.9	0.7	1.0	1.2	1.4	1.8	2.2	2.7	3.1	3.9	4.6	6.2
Sweden	5.0	5.6	5.7	6.1	6.0	5.6	5.4	5.3	5.3	5.3	5.3	5.3
Switzerland	15.2	16.3	17.6	18.6	18.9	19.0	19.3	19.7	19.9	20.0	20.2	20.3
UK	3.2	3.2	3.5	3.6	3.4	3.8	4.0	4.4	4.5	4.7	4.9	5.2

Source: OECD (1999a), Table A.1.6 (1988-1990 data); OECD (2003), Table A.1.5 (1992 data); OECD 2005), Table A.1.5 (1994 data);
OECD (2007), Table A.1.5 (1996-2005 data).

Figure 1: Fertility Rates, W. Europe, 1960--2005

Legend:
- Austria
- Belgium
- Denmark
- Finland
- France
- Germany
- Greece
- Ireland
- Italy
- Netherlands
- Norway
- Portugal
- Spain
- Sweden
- Switzerland
- United Kingdom

Figure 2: Old-Age Dependency Ratio
West European Countries, 1960--2006
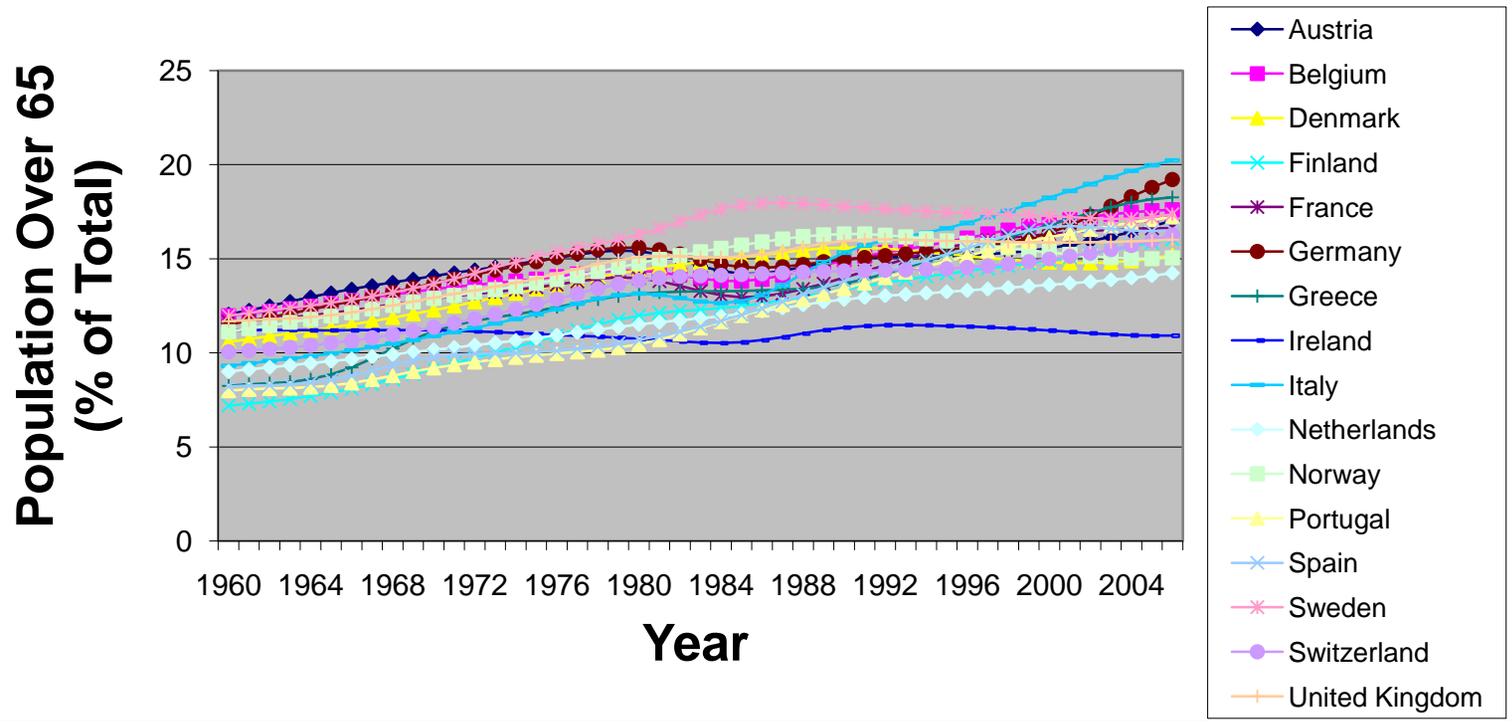
Figure 3: Fertility, by Region, 1960--2005

Fertility Rate (y-axis: 0 to 8)

Year (x-axis: 1960 to 2004)

Legend:

- Europe & Central Asia Fertility rate, total (births per woman)
- European Monetary Union Fertility rate, total (births per woman)
- Middle East & North Africa Fertility rate, total (births per woman)
- Sub-Saharan Africa Fertility rate, total (births per woman)
- South Asia Fertility rate, total (births per woman)
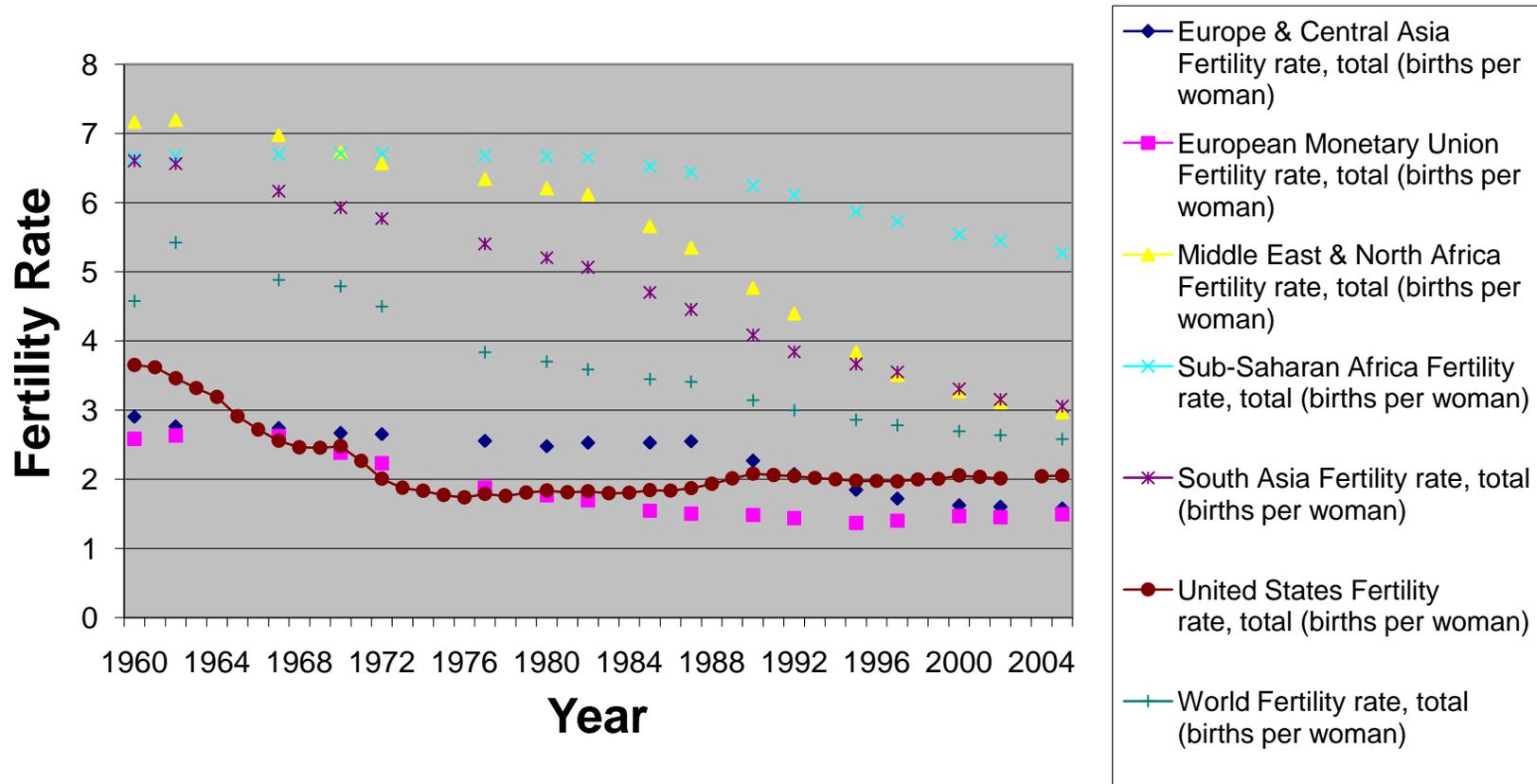- United States Fertility rate, total (births per woman)
- World Fertility rate, total (births per woman)

Figure 4: GDP per Capita, by Region, 1960--2006

Legend:
- Europe & Central Asia GDP per capita (constant 2000 US$)
- European Monetary Union GDP per capita (constant 2000 US$)
- Middle East & North Africa GDP per capita (constant 2000 US$)
- Sub-Saharan Africa GDP per capita (constant 2000 US$)
- South Asia GDP per capita (constant 2000 US$)
- World GDP per capita (constant 2000 US$)

Y-axis: GDP per capita (0, 5000, 10000, 15000, 20000, 25000)
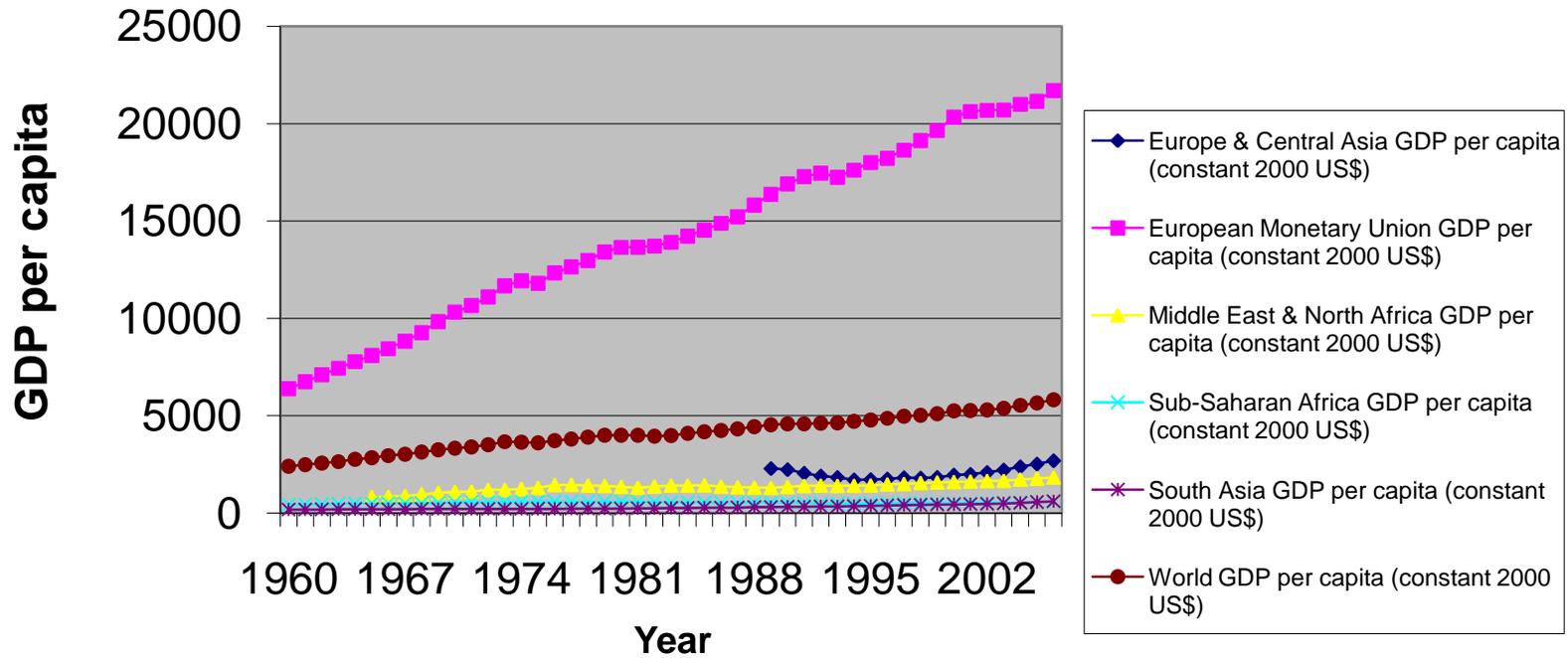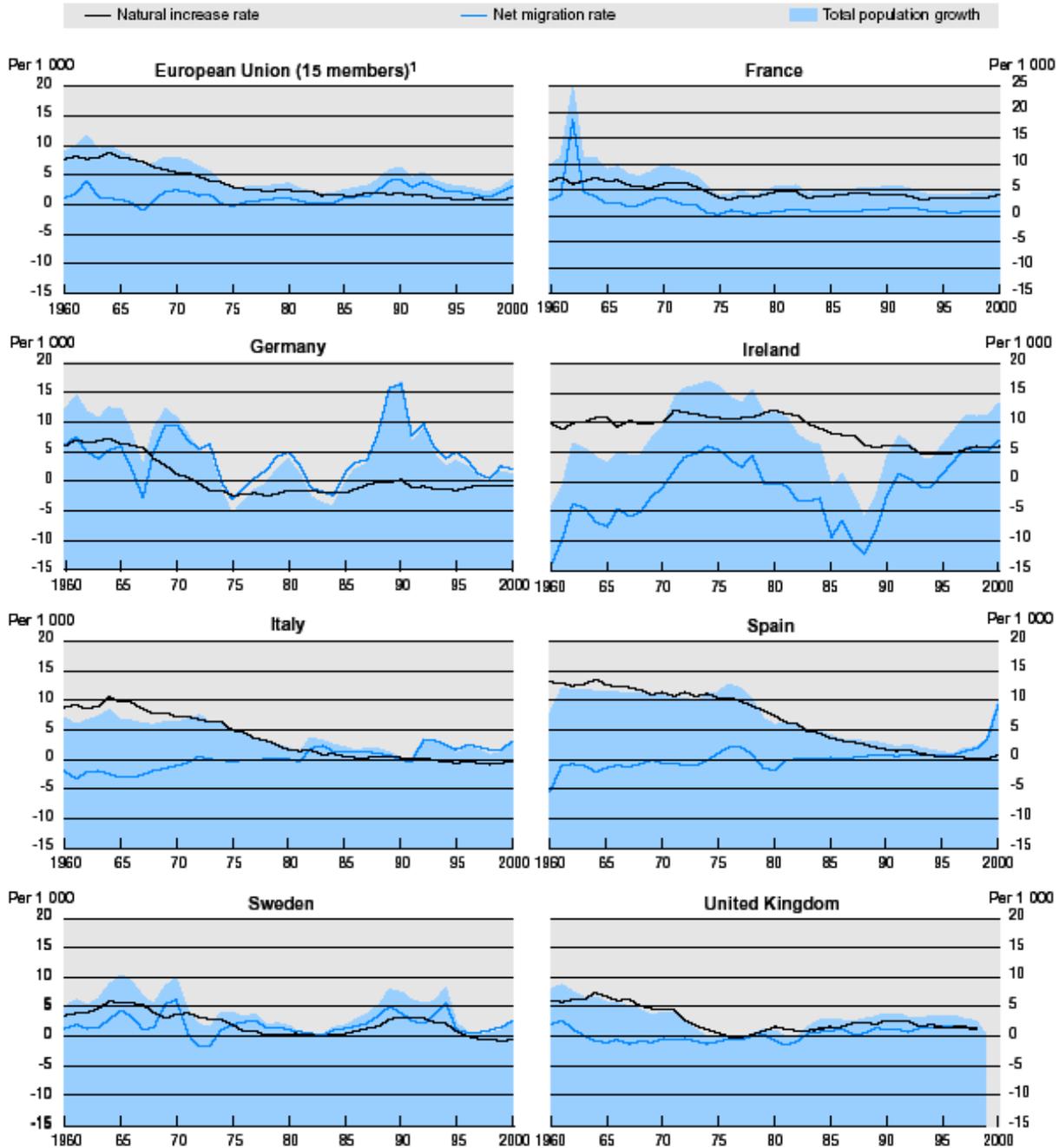X-axis: Year (1960, 1967, 1974, 1981, 1988, 1995, 2002)

Figure 5

Chart I.10. Components of total population growth in selected OECD countries and in the European Union, 1960-2000

Per 1 000 inhabitants at the beginning of the year

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